Appendix A — Restoration

1. Introduction & Background

The Coos County natural gas pipeline project consists of two major pipeline segments. The "main line" runs approximately 60 miles from near Roseburg to the city of Coos Bay. A branch or "lateral" line runs from the mainline near Fairview southwest to the vicinity of Johnson Mill, on the north bank of the Coquille River, and thence northwest to the city of Coquille. (Another lateral line runs from Johnson Mill southeast to the town of Myrtle Point. However, that line was constructed in accordance with a Department of the Army permit, and is not part of the current enforcement action.) Coos County has already undertaken restoration of rivers, streams, and wetlands impacted by construction of the pipeline pursuant to the restoration plan developed and implemented by GeoEngineers, Inc., which was developed consistent with the September 9, 2004, Memorandum of Agreement between Coos County and the US Army Corps of Engineers, and which Coos County submitted to the Corps on August 25, 2005 ("GeoEngineers Restoration Plan"). This appendix sets out additional restoration measures required of Coos County where construction of the pipeline impacted rivers, streams or wetlands.

2. Definitions and Site Names

- The word "site" means 1) a location where the pipeline crossed a river, stream or wetland using a construction technique that resulted in a discharge of dredged or fill material into the stream or wetland, or 2) an area leading to from such crossings where sediment from the construction activity could or can reach a river, stream or wetland.
- The term "active site" denotes a site which the Corps of Engineers has not approved as being satisfactorily restored.
- The term "main line" means the 12-inch pipeline running from near Roseburg to Coos Bay, Oregon.
- The term "lateral line" means the 6-inch and 4-inch lines running from the main line near the town of Fairview to the vicinity of Johnson Mill on the north bank of the Coquille River, and from there to Coquille.
- The term "in-road site" means a site on the Coos Bay Wagon Road or some other pre-existing road where the pipeline was installed beneath the road surface and beneath a culvert through which a stream passes.
- The term "cross-country site" means any site other than an in-road site.
- The term "in-water work window" means the period designated for a particular location in the Oregon Department of Fish and Wildlife publication *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources*, dated June 2000, unless a different period has been designated or approved in writing by NOAA Fisheries.

- A "reasonably expected precipitation event" means a 20-year, 48-hour event estimated using rainfall data from
  - the nearest US Weather Service or other reliable instrumentation location
  - whose data base is sufficient to allow calculation of such events, and
  - whose position in the landscape is such that precipitation amounts and durations at the instrument location are reasonably representative of conditions at the crossing in question.
- The term "satisfactorily restored site" means a site which the Corps of Engineers has approved as being stabilized and revegetated in accordance with the requirements of the Consent Order and this appendix. Further monitoring, streambank stabilization, channel stabilization, revegetation and the like are not required for satisfactorily restored sites.

The Coos County Pipeline Project crosses more than 200 streams and wetlands. Several different naming and numbering schemes have been used by different persons or groups. Given the potential for misunderstanding or confusion, the Corps of Engineers believes it essential the parties to this agreement use the same numbering scheme. Current Corps of Engineers and County ID numbers for the crossings are shown in Table 1. The Corps of Engineers and the County expect to resolve the discrepancies in Table 1 during field inspections in the Spring of 2008.

3. General Restoration Requirements

The County shall undertake reasonable restoration of areas impacted by pipeline construction activities within 100 feet on either side of an affected tributary or jurisdictional area. Restoration will include grade control within each channel's Ordinary High Water Mark (OHWM), riparian plantings within 30 horizontal feet (HF) from the OHWM, streambank stabilization within 50 HF from the OHWM, and slope erosion control within 100 HF from the OHWM.

A substantial portion of the mainline was installed in public roads, including the existing Coos Bay Wagon Road. While this in-road work resulted in substantial impacts to waters of the U.S., the Corps of Engineers agrees that Coos County has performed all work necessary to satisfactorily restore all in-road crossing sites on the mainline. In addition, the Corps of Engineers and Coos County have agreed that Coos County has performed all work necessary to satisfactorily restore the cross-country crossings shown in Table 2, in accordance with the success criteria below.

All other sites on both the Main Line and the Lateral Line shall initially be considered active sites.

Success Criteria

A site will be considered satisfactorily restored when the following conditions, as applicable, are met:

- Stream banks and bottom, adjacent riparian areas, and nearby slopes are stable and will withstand reasonably expected precipitation events with only minimal further erosion or contribution of sediment to the stream.
- Woody vegetation consistent in species composition and density with that present at the site prior to construction has been re-established and is expected to succeed to a self-sustaining vegetative community. The density of native vegetation at each fully restored stream crossing shall be equal to 80 percent or greater of the established baseline from the adjacent area.
- Total areal coverage of seeded groundcover is equal to or greater than 90 percent.
- All road crossings at cross-country sites are culverted, with the culvert size being sufficient to pass the flow resulting from reasonably expected precipitation events, and with the bottom of the culvert being at the elevation of the stream bed or countersunk below the stream bed and backfilled.

Note that in order to stabilize banklines, riparian areas and nearby slopes, it may be necessary to plant or seed with species or densities beyond that required to simply replace pre-construction vegetation.

In order to be considered self-sustaining, vegetation must not have been planted, re-planted, irrigated, fertilized or otherwise maintained within the two years prior to the inspection upon which the determination of success is based.

Where the composition and density of vegetation prior to construction is not known, the vegetation immediately upstream and downstream of the area cleared for construction will be considered representative of that present on the site prior to construction.

Responsibility for Obtaining Access

The County shall use best efforts to obtain any necessary permission for inspection access to all properties it does not own, and to obtain such permission, easements or other instruments as may be necessary to carry out any needed restoration actions.

Should the County be unable to obtain the necessary access, the County shall notify the Corps of that fact. The notification shall include the site designation, the legal description of the property involved, the name, address and phone number of the property owner, and a chronology of the County's efforts to obtain access.

Should the County ultimately be unable to carry out the required restoration actions because it is unable to obtain access to the property, the Corps and the County will attempt to reach agreement on stream enhancements or some other form of mitigation to offset the impacts resulting from the inability to carry out restoration. Should the County and the Corps of Engineers not reach agreement on alternative forms of mitigation in the absence of access necessary to conduct restoration, the dispute shall be handled in accordance with the Dispute Resolution section of the Consent Decree.

4. Inspection, Assessment and Restoration Requirements at Specific Sites

The Corps of Engineers and the County have agreed upon restoration activities to be undertaken in 2008. Those activities are shown in Table 3. The County shall prepare and submit Restoration Work Plans for that work by February 28, 2008. (The nature and content of such plans is described below.) After review and approval of those work plans by the Corps of Engineers, the County shall undertake the restoration activities in 2008, during the in-water work window appropriate to the site location.

The County has also agreed to assess the adequacy (size, elevation, alignment and slope) of road crossing culverts at a number of locations where the culvert could be affecting streambank stability. Those locations are also shown in Table 3.

5. Monitoring of Active Sites

Inspection of Active Sites

The Corps of Engineers and the County have agreed upon a list of sites to be inspected during the Spring of 2008, for the purpose of determining whether further restoration measures are required. Those sites are shown in Table 3.

Absent additional restoration action at an active site, subsequent inspections shall be carried out at least every other year. If additional restoration actions are carried out at a given active site, that site shall be inspected the following year, with subsequent inspections at least every other year. Inspection of an active site shall continue until the site is found to be satisfactorily restored.

Inspections shall be carried out during the months of April or May, so that the stability of stream bed and banks over the previous winter may be assessed.

During each inspection, Coos County shall

- document existing conditions by photograph and daily field reports.
- count each tree and shrub species and record the health of the plant community, using representative plots for each site.
- examine the vegetation for signs of drought stress and record any plant mortality.
- estimate the vegetative cover, as well as the coverage of bare ground and invasive species.

Photographs shall be taken with a digital camera and shall be of a resolution and quality sufficient to allow the production of reasonable quality 5x7 or larger prints. The number of photos taken at a given site shall be sufficient to determine the stability of stream beds, banks, and adjacent slopes, and to determine the success of restoration planting and seeding, and the overall abundance of vegetation on each site.

For each photograph the County shall note: 1) the data file name; 2) the designation of the crossing involved, using the identification system described elsewhere in this document; 3) the date upon which the photo was taken; 4) the direction toward which the camera was pointed; 5) whether the photo is looking upstream or downstream (if applicable), and; 6) a brief description of what the photo is illustrating.

The County shall ensure the data for each site (i.e., photographs and field notes) are sufficient to allow a determination of whether further restoration work is needed at the site.

Site Analysis and Recommendation

Based upon the inspection results, for each active site the County shall prepare a brief (e.g., one-page) analysis of conditions at the site. The County shall also either

- recommend restoration actions to be undertaken during the next in-water work window, or
- recommend that restoration is not currently needed, but monitoring should continue, or
- state that it believes the site has been satisfactorily restored.

Where the County believes a site has been satisfactorily restored, the County shall also provide a brief description of the restoration measures that have been taken at that location, when those measures were taken, and the impact of those measures.

Monitoring Reports

The County shall provide the Corps of Engineers with a report transmitting representative photographs, site analyses and recommended actions for the sites inspected that year. The report shall be submitted by July 31, and be sent to:

U.S. Army Corps of Engineers
ATTN: Enforcement Team Leader
Regulatory Branch (OD-G)
P.O. Box 2946
Portland, Oregon 97208

With the hard copy document, the County shall provide copies of the original data files for all digital photographs, whether used in the report or not. The County shall also provide a photograph log file which shows, for each photograph: 1) the data file name; 2) the designation of the crossing involved, using the identification system described elsewhere in this document; 3) the date upon which the photo was taken; 4) the general direction toward which the camera was pointed; 5) whether the photo is looking upstream or downstream (if applicable); and 6) a brief description of what the photo is illustrating.

Corps Review of Monitoring Reports

The Corps shall review the monitoring report and recommended actions, and respond to the County by September 30 of the year of submission of the report and recommended actions.

For each active site the Corps shall either concur with the County's proposed action or statement of satisfactory restoration, or indicate the action it believes necessary and provide its reasons for doing so. Where the County has recommended restoration action not be undertaken the following year, and the Corps believes such action to be necessary, the Corps shall provide a brief written summary of the measures it believes appropriate and the reasons it believes such measures are appropriate. The Corps and County shall also, at their earliest convenience, discuss those issues and attempt to reach agreement on the matter.

If the County and the Corps are unable to reach agreement upon whether a site has been satisfactorily restored or upon the actions to be taken at a given site, the issue shall be resolved in accordance with the Dispute Resolution section of the Consent Decree.

6. Implementation of Restoration Activities

Preparation of Restoration Work Plans

Where the County proposes restoration action be taken on an active site, or where the Corps of Engineers determines restoration action to be necessary, the County shall prepare a proposed work plan for the site. The plan shall provide information in sufficient detail to permit adequate review by the Corps of Engineers including, but not limited to, the following information:

- A description of the work to be accomplished
- The general methods to be used to achieve that work
- The sequence in which the work will be completed and the equipment to be used
- Contact information for the consultant or project manager and, upon availability, the contractor responsible for carrying out the work
- Sketches and plan views for the work, at least roughly to scale. Each shall contain a graphic scale.
- A time table for implementation of the restoration
- Methods to be used to minimize adverse impacts to water quality and existing vegetation during the restoration work
- The species to be planted, replanted, or seeded, the density for such species, the location, and planting and post planting practices
- The time period during which revegetation will occur

Submittal and Review of Restoration Work Plans

For restoration work to be done in 2009 and subsequent years, the County shall submit the package of restoration work plans for the work to be carried out during a given calendar year by December 31 of the previous year. The plans shall be sent to the same address as for monitoring reports, above. The Corps shall review the work plans and inform the County in writing of any concerns it may have by February 28 of the year in which the work is to be done. Should the

Corps have any such concerns, the Corps and the County shall, at their earliest convenience, discuss those concerns and attempt to reach agreement on the matter.

Should the County and the Corps be unable to reach agreement on the work to be done at a given site or on the adequacy of a work plan, the issue will be resolved in accordance with the Dispute Resolution section of the Consent Decree.

Restoration and Nationwide Permit Conditions

Work in waters of the US necessary to carry out the restoration will be authorized under the Corps of Engineers Nationwide Permit 32. Any authorization under that nationwide permit may be revoked if the County does not comply with the terms and conditions of the nationwide permit, including regional and case-specific special conditions, including in-water work window restrictions.

All restoration work involving the placement or removal or disturbance of rock, gravel, soil or similar materials on the banks or within the channel of a stream shall be carried out only during the ODFW in-water work window for the appropriate watershed. The County shall not begin such work unless there is sufficient time to complete the work and stabilize the disturbed area without having to seek an extension of the in-water work window. Once started, the work shall be pursued diligently until completed.

Table 1. ID Numbers and Locations of Cross-Country Stream and Wetland Crossing Sites. Sites on the first three pages of this table are on the Roseburg - Coos Bay main line. Sites on the last page of this table are on the Fairview - Coquille lateral line. All sites are in Universal Transverse Mercator (UTM) Zone 10

Corps ID	County ID	Stream Name	Easting	Northing	Tributary of
1.0	1	Unnamed	466496	4780417	Marsters Cr
2.0	2	Unnamed	466200	4780431	Marsters Cr
2.1	2.4	Unnamed	466108	4780436	Marsters Cr
2.5	2.9	Unnamed	466017	4780440	Marsters Cr
3.0	3	Unnamed	465540	4780463	Marsters Cr
3.1	3a	Unnamed	465072	4780484	Marsters Cr
4.0	4	Powderhouse Canyon	465037	4780486	Marsters Cr
5.0	5	Unnamed	464602	4780507	Marsters Cr
6.0	6	Unnamed	464202	4780527	Marsters Cr
6.5	6.5	Unnamed	463975	4780538	Marsters Cr
7.0	7	Unnamed	463721	4780551	Marsters Cr
8.0	8	Unnamed	463568	4780556	Marsters Cr
8.1		Unnamed	462001	4780557	Lookingglass Cr
9.0	9	Unnamed	461369	4780518	Lookingglass Cr
9.1		Unnamed	461132	4780513	Lookingglass Cr
10.0	10	Unnamed	460328	4780490	Lookingglass Cr
11.0	11	Unnamed	459888	4780495	Lookingglass Cr
12.0	12	Unnamed	459721	4780492	Lookingglass Cr
13.0	13	Unnamed	459617	4780489	Lookingglass Cr
13.1		Unnamed	458621	4780474	Morgan Cr
13.2		Unnamed	458550	4780473	Morgan Cr
14.0	14	Unnamed	457960	4780475	Morgan Cr
15.0	15	Unnamed	457828	4780490	Morgan Cr
16.0	16	Unnamed	457653	4780509	Morgan Cr
17.0	17	Unnamed	457567	4780543	Morgan Cr
18.0	18	Unnamed	457250	4780579	Morgan Cr
19.0	19	Unnamed	457120	4780592	Morgan Cr
20.0	20	Unnamed	457056	4780599	Morgan Cr
21.0	21	Unnamed	456931	4780613	Morgan Cr
21.1		Unnamed	456879	4780620	Morgan Cr
22.0	22	Unnamed	455634	4780718	Morgan Cr
23.0	23	Morgan Creek	454991	4781174	Lookingglass Cr
24.0	24	Unnamed	454970	4781185	Morgan Cr
25.0	25	Unnamed	454545	4780954	Morgan Cr
26.0	26	Unnamed	454014	4780829	Morgan Cr
27.0	27	Unnamed	453934	4780703	Rock Cr
28.0	28	Unnamed	453825	4780587	Rock Cr
29.0	29	Unnamed	453601	4780422	Rock Cr
30.0	30	Unnamed	453459	4780323	Rock Cr
31.0		Unnamed	453085	4780072	Rock Cr
32.0	32	Unnamed	453024	4780024	Rock Cr
32a		Unnamed			Rock Cr
32b		Unnamed			Rock Cr
33.0	33	Unnamed	452519	4779659	Rock Cr
34.0	34	Unnamed	452401	4779577	Rock Cr
34.5	34.5	Unnamed	452247	4779472	Rock Cr
34.5.1	34.5a	Unnamed	452216	4779448	Rock Cr

Table 1 (cont). ID Numbers and Locations of Cross-Country Stream and Wetland Crossing Sites.

Corps ID	County ID	Stream Name	Easting	Northing	Tributary of
35.0	35	Unnamed	451944	4779256	Rock Cr
36.0	36	Unnamed	451855	4779193	Rock Cr
37.0	37	Rock Cr	451411	4778812	Morgan Cr
38.0	38	Unnamed	450918	4778532	Rock Cr
38A	38a	Unnamed	450765	4778424	Rock Cr
38B	38.2	Unnamed	450372	4777641	North Fork Tenmile Cr
39.0	39a	Unnamed	450360	4777616	North Fork Tenmile Cr
39A	39b	Unnamed	450340	4777572	North Fork Tenmile Cr
39A.1	39c	Unnamed	450192	4777209	North Fork Tenmile Cr
40.0	40	Unnamed	450131	4777138	North Fork Tenmile Cr
41.0	41	Unnamed	450003	4777041	North Fork Tenmile Cr
42.0	42	Unnamed	449656	4776778	North Fork Tenmile Cr
43.0	43	Unnamed	449247	4776474	North Fork Tenmile Cr
44.0	44	Unnamed	449038	4776313	Tenmile Cr
45.0	45	Unnamed	448957	4776251	Tenmile Cr
46.0	46	Unnamed	448747	4776112	Tenmile Cr
47.0	47	Unnamed	448546	4776127	Tenmile Cr
48.0	48	Unnamed	448369	4776095	Tenmile Cr
48.1		Unnamed	448276	4776098	Tenmile Cr
48.2		Unnamed	448153	4776124	Tenmile Cr
48.3		Unnamed	447973	4776147	Tenmile Cr
49.0	49	Tenmile Cr	447624	4776176	Olalla Cr.
49A	49a	Unnamed	447104	4776238	Wilson Cr
49B	49.5	Unnamed	446851	4776256	Wilson Cr
49W	49.5w	Unnamed	446831	4776258	Wilson Cr
50.0	50	Unnamed	445616	4776321	Tenmile Cr
51.0	51	Unnamed	445427	4776344	Tenmile Cr
52.0	52	Unnamed	444802	4776416	East Fork Coquille River
52W		Unnamed	444719	4776423	East Fork Coquille River
52A.1		Unnamed	444479	4776584	East Fork Coquille River
52A.2		Unnamed	442857	4776985	East Fork Coquille River
111.0	111	Unnamed	418975	4779961	East Fork Coquille River
112.0	112	Unnamed	418717	4780191	East Fork Coquille River
112.1	112.3	Unnamed	418407	4780447	Cherry Creek
112A	112.3	Unnamed	418091	4780712	Cherry Creek
113.0	113	Cherry Cr	417752	4780943	Middle Cr
113.1		Unnamed	417460	4781160	Middle Cr
113.2		Unnamed	417392	4781229	Middle Cr
113.3		Unnamed	417209	4781371	Middle Cr
113.4		Unnamed	417027	4781475	Middle Cr
114.0	114	Middle Cr	416771	4781790	North Fork Coquille River
116.0	116	Unnamed	415557	4782691	North Fork Coquille River
117.0	117	Unnamed	415530	4782729	North Fork Coquille River
118.0	118	Unnamed	415497	4782770	North Fork Coquille River
119.0	119	Unnamed	415432	4782849	North Fork Coquille River
120.0	120	Unnamed	415397	4782892	North Fork Coquille River
120.1		Unnamed	414546	4783873	North Fork Coquille River
120.2		Unnamed	414020	4784432	North Fork Coquille River

Table 1 (cont). ID Numbers and Locations of Cross-Country Stream and Wetland Crossing Sites.

Corps ID	County ID	Stream Name	Easting	Northing	Tributary of
121.0	121	N. Fork Coquille R	413034	4784907	Coquille River
122.0	122	Fairview Wetland	412409	4785135	North Fork Coquille River
122.1		Unnamed	411952	4785901	Evans Cr
170.0	170	Unnamed	404848	4793859	Boone Creek
170.1		Unnamed	403531	4794200	Isthmus Slough
175.0	175	Isthmus Sl. Bottoms	402337	4795229	Isthmus Slough
176.0	176	Isthmus Slough	401931	4795192	Coos Bay
176.1		Unnamed	401484	4795163	Isthmus Slough
176A		Unnamed	401347	4795187	Isthmus Slough
177.0	177	Unnamed	401273	4795369	Isthmus Slough
	177a	Unnamed			
	177b	Unnamed			
178.0	178	Unnamed	401246	4795451	Isthmus Slough
178.1		Unnamed	401234	4795486	Isthmus Slough
179.0	179	Unnamed	401135	4795787	Isthmus Slough
179.5		Unnamed	400966	4796333	Shinglehouse Slough
179.5.1		Unnamed	400936	4796431	Shinglehouse Slough
179.9		Unnamed	400906	4796464	Shinglehouse Slough
180.0	180	Shinglehouse Slough	400855	4796607	Isthmus Slough
181.0	181	Unnamed	400727	4796875	Shinglehouse Slough
181A		Unnamed	400758	4796898	Shinglehouse Slough
181B	182	Unnamed	400605	4797305	Shinglehouse Slough
182.0	182a	Unnamed	400600	4797320	Shinglehouse Slough
183.0	183	Unnamed	400310	4797948	Coalbank Slough
184.0		Coalbank Creek	399988	4798473	Coalbank Slough
185.0		Boatman Gulch	399979	4798595	Coalbank Slough
186.0	186.1	Unnamed	399899	4799273	Coalbank Slough
187.0		Unnamed	399734	4800339	Coalbank Slough
188.0	188	Blossom Gulch	400394	4802207	Isthmus Slough
	188a	Blossom Gulch			
	188b	Blossom Gulch			
	188c	Blossom Gulch			
	188d	Blossom Gulch			

Table 1 (cont). ID Numbers and Locations of Cross-Country Stream and Wetland Crossing Sites.

Corps ID	County ID	Stream Name	Easting	Northing	Tributary of
FLS 1	FLS 1	Unnamed	404318	4776821	Glen Aiken Creek
FLS 2	FLS 2	Unnamed	404762	4777089	Glen Aiken Creek
FLS 3	FLS 3	Unnamed	405274	4777801	Glen Aiken Creek
FLS 4	FLS 4	Unnamed	411544	4783554	North Fork Coquille River
FLS 5	FLS 5	Steele Creek	411832	4783667	North Fork Coquille River
FLS 6	FLS 6	Unnamed	411963	4783759	North Fork Coquille River
FLS 8	FLS 8	Unnamed	406619	4778644	Glen Aiken Creek
FLS 9	FLS 9	Unnamed	406586	4778591	Glen Aiken Creek
FLS 10	FLS 10	Unnamed	406688	4778698	Glen Aiken Creek
FLS 11	FLS 11	Unnamed	406761	4778761	Glen Aiken Creek
FLS 12	FLS 12	Unnamed	406931	4778756	Glen Aiken Creek
FLS 13	FLS 13	Unnamed	407243	4778869	Fall Creek
FLS 14	FLS 14	Unnamed	407985	4779205	North Fork Coquille River
FLS 15	FLS 15	Unnamed	409433	4780258	Lost Creek
FLS 16	FLS 16	Unnamed	409477	4780351	Lost Creek
FLS 17	FLS 17	Unnamed	409535	4780419	Lost Creek
FLS 18	FLS 18	Lost Creek	409550	4780478	North Fork Coquille River
FLS 19	FLS 19	Unnamed	409662	4780690	Lost Creek
FLS 20	FLS 20	Unnamed	409782	4780922	Lost Creek
FLS 21	FLS 21	Unnamed	409786	4780936	Lost Creek
FLS 22	FLS 22	Unnamed	410042	4781453	Lost Creek
FLS 23	FLS 23	Unnamed	410354	4782082	Lost Creek
FLS 24	FLS 24	Blair Creek	410513	4782399	North Fork Coquille River
FLS 25	FLS 25	Unnamed	410671	4782711	North Fork Coquille River
FLS 26	FLS 26	Unnamed	410710	4782808	North Fork Coquille River
FLS 27	FLS 27	Unnamed	410735	4782847	North Fork Coquille River
FLS 28	FLS 28	Unnamed	410818	4783008	North Fork Coquille River
FLS 29	FLS 29	Unnamed	410940	4783262	North Fork Coquille River
FLS 30	FLS 30	Unnamed	411305	4783472	North Fork Coquille River
		"Railroad Wetlands"			Rink Creek

Table 2. Sites already satisfactorily restored.

Corps ID	County ID	Stream Name
2.1	2.4	Unnamed
2.5	2.9	Unnamed
3.0	3	Unnamed
5.0	5	Unnamed
6.5	6.5	Unnamed
7.0	7	Unnamed
8.0	8	Unnamed
8.1		Unnamed
9.1		Unnamed
10.0	10	Unnamed
11.0	11	Unnamed
12.0	12	Unnamed
13.0	13	Unnamed
13.1		Unnamed
13.2		Unnamed
14.0	14	Unnamed
15.0	15	Unnamed
16.0	16	Unnamed
17.0	17	Unnamed
18.0	18	Unnamed
19.0	19	Unnamed
20.0	20	Unnamed
21.0	21	Unnamed
21.1		Unnamed
22.0	22	Unnamed
23.0	23	Morgan Creek
24.0	24	Unnamed
25.0	25	Unnamed
26.0	26	Unnamed
27.0	27	Unnamed
29.0	29	Unnamed
34.0	34	Unnamed
36.0	36	Unnamed
37.0	37	Rock Creek
38.0	38	Unnamed
40.0	40	Unnamed
41.0	41	Unnamed
42.0	42	Unnamed
44.0	44	Unnamed
45.0	45	Unnamed
47.0	47	Unnamed
48.0	48	Unnamed
48.1		Unnamed
48.2		Unnamed
48.3		Unnamed
49.0	49	Tenmile Creek
49W	49.5w	Unnamed
50.0	50	Unnamed
51.0	51	Unnamed
52.0	52	Unnamed
52W		Unnamed
52A.1		Unnamed
52A.2		Unnamed
111.0	111	Unnamed
113.0	113	Cherry Creek

Corps ID	County ID	Stream Name
113.1		Unnamed
113.2		Unnamed
113.3		Unnamed
113.4		Unnamed
114.0	114	Middle Creek
118.0	118	Unnamed
119.0	119	Unnamed
120.0	120	Unnamed
120.1		Unnamed
121.0	121	North Fork Coquille R.
122.0	122	Fairview Wetland
122.1		Unnamed
175.0	175	Unnamed
176.0	176	Isthmus Slough
176.1		Unnamed
176A		Unnamed
178.0	178	Unnamed
178.1		Unnamed
179.0	179	Unnamed
179.5		Unnamed
179.5.1		Unnamed
179.9		Unnamed
180.0	180	Shinglehouse Slough
181.0	181	Unnamed
184.0	184	Coalbank Creek
185.0	185	Boatman Gulch
186.0	186.1	Unnamed
FLS 1	FLS 1	Unnamed
FLS 2	FLS 2	Unnamed
FLS 3	FLS 3	Unnamed
FLS 4	FLS 4	Unnamed
FLS 5	FLS 5	Steele Creek
FLS 6	FLS 6	Unnamed
FLS 7	FLS 7	Unnamed
FLS 8	FLS 8	Unnamed
FLS 9	FLS 9	Unnamed
FLS 10	FLS 10	Unnamed
FLS 11	FLS 11	Unnamed
FLS 12	FLS 12	Unnamed
FLS 13	FLS 13	Unnamed
FLS 14	FLS 14	Unnamed
FLS 15	FLS 15	Unnamed
FLS 16	FLS 16	Unnamed
FLS 17	FLS 17	Unnamed
FLS 20	FLS 20	Unnamed
FLS 21	FLS 21	Unnamed
FLS 23	FLS 23	Unnamed
FLS 24	FLS 24	Blair Creek
FLS 25	FLS 25	Unnamed
FLS 26	FLS 26	Unnamed
FLS 27	FLS 27	Unnamed
FLS 28	FLS 28	Unnamed
FLS 29	FLS 29	Unnamed
FLS 30	FLS 30	Unnamed
"RR Wetlands"		Rink Creek

Table 3. Inspection, Assessment and Restoration Actions Planned for 2008

Corps ID	County ID	Action
1.0	1	Joint inspection, Spring 2008
2.0	2	Assess culvert size, elevation, alignment and slope
3.1	3a	Assess culvert size, elevation, alignment and slope
4.0	4	Additional plantings per existing GeoEngineers (County) plan Remove coir logs at toe of bank
6.0	6	Additional plantings per existing GeoEngineers (County) plan Assess culvert size, elevation, alignment and slope
9.0	9	Remove road crossing and restore area, or replace existing culvert with one of proper size, elevation, alignment and slope, with sufficient material over the top of the culvert to ensure it will not be crushed by farm equipment. This culvert was installed per an agreement between MasTec and a landowner, independent of the Coos County Natural Gas Pipeline Project.
28.0	28	Assess culvert size, elevation, alignment and slope
30.0	30	Additional plantings per existing GeoEngineers (County) plan Assess culvert size, elevation, alignment and slope
31.0	31	Install fencing to keep cattle out of area of plantings Replant woody vegetation
32.0	32	Joint inspection, Spring 2008
	32a	Joint inspection, Spring 2008
	32b	Joint inspection, Spring 2008
33.0	33	Joint inspection, Spring 2008
34.5	34.5	Joint inspection, Spring 2008
34.5.1	34.5a	Joint inspection, Spring 2008
35.0	35	Joint inspection, Spring 2008
38A	38a	Additional plantings per existing GeoEngineers (County) plan
38B	38b	Additional plantings per existing GeoEngineers (County) plan
39.0	39a	Joint inspection, Spring 2008
39A	39b	Joint inspection, Spring 2008
39A.1	39c	Joint inspection, Spring 2008

Table 3 (cont). Inspection, Assessment and Restoration Actions Planned for 2008

Corps ID	County ID	Action
43.0	43	Additional plantings per existing GeoEngineers (County) plan Cut off and remove exposed portion of flume pipe
46.0	46	Joint inspection, Spring 2008
49A	49a	Joint inspection, Spring 2008
49B	49.5	Joint inspection, Spring 2008
112.0	112	Joint inspection, Spring 2008
112.1	112.3	Joint inspection, Spring 2008
112A	112.3	Joint inspection, Spring 2008
116.0	116	Joint inspection, Spring 2008
117.0	117	Additional plantings per existing GeoEngineers (County) plan
170.0	170	Additional plantings, discontinue herbicide applications and manually control scotch broom, per existing GeoEngineers (County) plan
177.0	177	Discontinue herbicide applications and manually control scotch broom and Himalaya blackberry, per existing GeoEngineers (County) plan
	177a	Reseed for erosion control, per existing GeoEngineers (County) plan
	177b	Discontinue herbicide applications and manually control scotch broom, per existing GeoEngineers (County) plan
181A		Joint inspection, Spring 2008
181B	182	Joint inspection, Spring 2008
182.0	182a	Joint inspection, Spring 2008
183.0	183	Joint inspection, Spring 2008
187.0	187	Joint inspection, Spring 2008
188.0	188	Joint inspection, Spring 2008
	188a	Joint inspection, Spring 2008
	188b	Joint inspection, Spring 2008
	188c	Joint inspection, Spring 2008
	188d	Joint inspection, Spring 2008

Table 3 (cont). Inspection, Assessment and Restoration Actions Planned for 2008

Corps ID	County ID	Action
FLS 18	FLS 18	Joint inspection, Spring 2008
FLS 19	FLS 19	Joint inspection, Spring 2008
FLS 22	FLS 22	Joint inspection, Spring 2008

TABLE 4. Monitoring and Restoration Action Schedule

Schedule for 2008

Date	Milestone
28 February 2008	County submittal of work plans for restoration sites in Table 3
31 March 2008	Corps response to proposed work plans
April - May 2008	Joint inspection of sites in Table 3
31 July 2008	County submittal of monitoring report, with site analyses and recommended actions
30 September 2008	Corps response to monitoring report and recommended actions
31 December 2008	County submittal of restoration work plans for following year

Schedule for 2009 & Subsequent Years

Date	Milestone
April - May	Site inspections
31 July	County submittal of monitoring report, with site analyses and recommended actions
30 September	Corps response to monitoring report and recommended actions
31 December	County submittal of restoration work plans for following year
28 February	Corps response to proposed restoration work plans

Appendix B
Supplemental Environmental Projects

1. Introduction and Background

Environmental Protection Agency policy allows the performance of Supplemental Environmental Projects (SEPs) to be taken into account in establishing the monetary penalty appropriate for settlement of a violation of Clean Water Act requirements. In a September 9, 2004, Memorandum of Agreement between Coos County and the U.S. Army Corps of Engineers (Corps of Engineers), Coos County agreed to spend $525,000 carrying out Supplemental Environmental Projects involving fish passage improvement. The first of those projects was a bridge installation and culvert removal on Willanch Lane County Road in Coos County, with the County being credited $30,000 toward the $525,000 total. The remaining project locations are shown in Table 1 and in Maps 1-15. The County has also completed the project at Lost Creek, site 1 in Table 1. However, at this time the Corps of Engineers has not been presented with the schedule of costs for that project. Therefore, in the interest of simplicity, the remainder of this appendix refers to a balance of $495,000, with the understanding that amounts spent on the Lost Creek project will be applied to that balance.

2. Definitions and Site Locations

- The term "bankfull width" means the width of the stream channel at the elevation where it begins to spill onto the current, active floodplain. Where there is no current, active floodplain, bankfull elevation may be taken as the elevation at the top of streambed deposits (i.e., gravel bars) or approximated by consideration of other physical characteristics such as those in the definition of ordinary high water mark, below.
- The term "in-water work window" means the period designated for a particular location in the Oregon Department of Fish and Wildlife publication *Oregon Guidelines for Timing of In-Water Work to Protect Fish and Wildlife Resources,* dated June 2000, unless a different period has been designated or approved in writing by the National Marine Fisheries Service (NMFS, also known as NOAA Fisheries Service). For all locations proposed for SEP projects in this appendix, the standard ODFW window is July 1 – September 15.

- The term "ordinary high water mark" (OHWM) means that line on the shore established by the fluctuations of water and indicated by physical characteristics such as clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, the presence of litter and debris, or other appropriate means that consider the characteristics of the surrounding areas.

3. General Requirements

Coos County shall budget $495,000 over three years to be used in carrying out Supplemental Environmental Projects (hereafter, the SEP budget).

Each SEP shall consist of a "stream simulation" culvert replacement. Design and construction of each project shall be consistent with the remainder of this appendix and with chapters 6, 7, and 8, and other relevant chapters and appendices of *Design of Road Culverts for Fish Passage*, 2003 Edition, Washington Department of Fish and Wildlife (document is available at http://wdfw.wa.gov/hab/engineer/cm/), unless such design and construction would violate the requirements of OAR 635-412-0035, in which case the latter requirements shall apply to the extent necessary to avoid such violation. The basic components of stream simulation shall include:

- The culvert is oriented in line with the flow direction of the stream.
- The culvert is buried approximately at the slope of the stream and below its maximum scour depth.
- The culvert is embedded with an appropriate mix of properly sized material to recreate a bed and channel inside the culvert.
- The width of the bed inside the culvert is equal to or greater than 1.2 times the bankfull width of the stream, plus two feet.
- The open area of the culvert (i.e., after embedding) is capable of passing Q100 flows.

The County shall, to the degree possible, carry out these SEPs in the order shown in Table 1. The County shall carry out as many of the projects as possible within the total SEP budget of $495,000. If the amount remaining in the SEP budget is less than the amount needed to carry out the next project on the list, the County shall proceed to the first project on the list whose projected cost is less than the amount remaining in the SEP budget. If there is no project on the list with a projected cost less than the amount remaining in the SEP budget, the County may carry out a project whose cost exceeds the balance in the SEP budget. However, should it choose to do so, the County will *not* be due compensation for amounts spent in excess of $495,000. Alternatively, the County may pay the amount remaining in the SEP budget to the US Treasury, as below.

All SEPs shall be completed by the end of the 2011 in-water work window. Any money remaining in the SEP budget at that time shall be paid to the US Treasury within 60 days.

The Corps expects to authorize any discharges of dredged or fill material into waters of the United States associated with these projects under Nationwide Permit 32 (hereafter, NWP 32). However, NMFS is expected to list Oregon Coast Coho under the Endangered Species Act (ESA) in February 2008. In addition, the streams in which the SEPs would be performed are Essential Fisheries Habitat (EFH) under the Magnuson-Stevens Fishery Conservation and Management Act.

The Corps is pursuing programmatic ESA consultation on certain classes of activities (Special Local Operating Procedures – Endangered Species, or "SLOPES"). It appears the SEP

projects will fit under that programmatic SLOPES consultation, fulfilling both ESA and EFH consultation requirements. However, before issuing the verification of authorization, the Corps must obtain concurrence from NMFS that the projects do, in fact, fit within the programmatic consultation. Further, the Corps must coordinate with Oregon's State Historic Preservation Officer and appropriate Tribal governments regarding historic and cultural resources. Any of these steps could result in the Corps being unable to verify authorization of the SEP project at a given location. In the event the Corps is unable to verify authorization of a given SEP project, the County shall move on to implementing the other projects lower on the priority list.

In carrying out the SEPs, the County shall comply with the terms of the NWP 32 verification of authorization, the national, regional and case-specific conditions of that verification, the requirements and conditions established by NMFS in the programmatic SLOPES consultation, the conditions established by the Oregon Department of Environmental Quality in its certification under section 401 of the Clean Water Act, and the conditions established by the Oregon Department of Land Conservation and Development in its Coastal Zone Management Act advance consistency concurrence under the Coastal Zone Management Act. The Corps will transmit the specific requirements of the NMFS programmatic consultation as soon as the final version of that consultation is made available to the Corps.

The County may also need to obtain one or more Removal-Fill permits from the Oregon Department of State Lands.

4. Design Requirements

As stated above, each project shall be designed in accordance with the relevant stream-simulation portions of *Design of Road Culverts for Fish Passage*, 2003 Edition, Washington Department of Fish and Wildlife. In particular, the determination of bankfull width (upon which necessary culvert size is based) will be based upon the definition in Appendix A and the guidance in Appendix H of that document. (Note the definition of Ordinary High Water Mark contained in that document is that established by the State of Washington, and is different than that in Corps of Engineers regulations. The Corps of Engineers definition is shown in section 2 of this appendix.)

In designing the SEP, stream gradient shall be measured upstream and downstream of the crossing over a distance of at least 20 channel-widths or 300 feet, whichever is greater. Bankfull width measurements shall be taken at several locations in relatively straight run sections of the stream over that same reach, and averaged. The County shall photograph the channel at each location where a bankfull width measurement was taken, and note the points on the bank used in that measurement.

The slope ratio gradient of the culvert design is a measure of the difference between the slope of the bed material inside the culvert (S_{culv}) and the natural channel slope (S_{ch}). The slope ratio
S_{culv} / S_{ch} shall not be greater than 1.25.

The culvert bed width $W_{culvert\ bed}$ (i.e., the width of the streambed material inside the culvert) shall be determined by

$$W_{culvert\ bed} > (1.2 \times W_{ch}) + 2$$

where W_{ch} is the average bankfull width obtained above, measured in feet.

Culvert embeddedness (i.e., the depth of streambed material inside the culvert) shall be 30% to 50% of the culvert height. Note that if the culvert is designed with less than 50% embeddedness, then the width of the culvert will necessarily be greater than $W_{culvert\ bed}$. The open area of the culvert (i.e., above the streambed material) must be capable of passing the expected 100-year flow event. Culvert bed design shall be in accordance with chapter 6 of *Design of Road Culverts for Fish Passage*, 2003 Edition, Washington Department of Fish and Wildlife unless such design would violate the requirements of OAR 635-412-0035, in which case the latter requirements shall apply to the extent necessary to avoid such violation.

5. Pre-Construction Notification and Construction of Projects

In 2008, at its earliest convenience, the County shall notify the Corps of Engineers of the SEPs it intends to carry out during the 2008 in-water work window. In subsequent years the County shall notify the Corps of Engineers by December 31 of the SEPs the County intends to carry out during the in-water work window for the following calendar year.

For each project the notification shall include the following:

- The bankfull channel width measurements and the data from which stream gradient was determined.
- A scaled map or aerial photo showing the stream above and below the project, and indicating the locations of bankfull channel width measurements.
- Ground-level photographs of the stream upstream and downstream of the existing culvert. These photographs must identify the locations at which bankfull channel width measurements were taken, and indicate the elevation points on the bank used in those measurements.
- Plan and cross-section views of the project.
- A work area isolation plan meeting the requirements of the NMFS programmatic consultation. If the County believes a work isolation plan is not necessary, the County shall provide information supporting that position.
- An erosion and pollution control plan meeting the requirements of the NMFS programmatic consultation.
- The proposed schedule for implementing the project.
- Information on *how* the work will be accomplished, e.g., the types of equipment to be used, the composition of streambed material to be placed within the culvert and how it will be placed, etc.
- All other information required by the programmatic consultation.

The Corps of Engineers will, within 60 days of its receipt of the above information, notify the County of any concerns it may have regarding the design, culvert size, culvert slope or other aspects of the proposed project. If the Corps of Engineers has any such concerns, the Corps and County shall, at their earliest convenience, discuss those issues and attempt to reach agreement on the matter. If the County and the Corps are unable to reach agreement, the issue shall be resolved in accordance with the section on Dispute Resolution of the Consent Decree.

The County will *not* proceed with a given project until it has been notified in writing that the project is authorized under nationwide 32, that the design for the project complies with Regional Condition 7, and that NMFS concurrence under the programmatic consultation has been obtained.

The County shall begin construction of each SEP early enough that work on that project can be completed by the end of the standard in-water work window. Once started, the County shall pursue the project diligently until completed.

6. Monitoring Requirements

For each project, the County shall submit an action completion report to NMFS and the Corps within 60 days of completing all work below the OHWM on that project. The report must include the data required by the NMFS programmatic consultation, including photos of habitat conditions before, during and after construction of the project.

The County shall monitor and maintain each completed project as part of its regular maintenance program, provided that the County shall inspect each project after the first winter following completion of the project, and at least one other time three to five years following completion of the project. During each inspection the County shall document conditions inside, upstream and downstream of the culvert, including any areas of scour or erosion.

Photographs shall be taken with a digital camera and shall be of a resolution and quality sufficient to allow the production of reasonable quality 5x7 or larger prints. For each photograph the County shall note: 1) the data file name; 2) the name and number designation of the project, using the designations in Table 1; 3) the date upon which the photo was taken; 4) the direction toward which the camera was pointed, 5) whether the photo is looking upstream or downstream (if applicable), and; 6) a brief description of what the photo is illustrating.

The County shall provide the Corps of Engineers with a report transmitting the photographs and other information for the projects inspected that year. The report shall be submitted by September 30, and be sent to:

U.S. Army Corps of Engineers
ATTN: Enforcement Team Leader
Regulatory Branch (OD-G)
P.O. Box 2946
Portland, Oregon 97208-2946

With the hard copy document, the County shall provide copies of the original data files for all digital photographs, whether used in the report or not. The County shall also provide a photograph log file which shows, for each photograph: 1) the data file name; 2) the designation of the crossing involved, using the identification system described elsewhere in this document; 3) the date upon which the photo was taken; 4) the general direction toward which the camera was pointed, 5) whether the photo is looking upstream or downstream (if applicable), and; 6) a brief description of what the photo is illustrating.

7. Remedial measures

Should the monitoring reveal any condition adversely affecting the stability or environmental benefit of the project (e.g., loss of culvert bed material), the County shall propose remedial measures to be taken, along with a schedule for implementing those measures. The Corps of Engineers will, within 60 days of its receipt of the proposal, notify the County of any concerns it may have regarding the design, or adequacy of the proposed remedial measures. If the Corps of Engineers has any such concerns, the Corps and County shall, at their earliest convenience, discuss those issues and attempt to reach agreement on the matter. If the County and the Corps are unable to reach agreement, the issue shall be resolved in accordance with the section on Dispute Resolution of the Consent Decree.

The County will *not* proceed with a given project until it has been notified in writing that the proposed remedial measures do not require NMFS concurrence under the programmatic consultation, or that concurrence has been obtained.

Table 1. Names and Locations of Supplemental Environmental Project Sites
All coordinates are based on NAD1983 datum.

Site Number	Location Description	UTM Zone	Easting	Northing
1	Lost Creek	10	411 125	4 781 815
2	Cardwell Creek	10	407 970	4 791 845
3	Panther Creek	10	408 340	4 791 650
4	Lower Catching Creek	10	406 320	4 791 665
5	Upper Catching Creek	10	406 330	4 791 560
6	Knapper Creek	10	442 675	4 777 130
7	Bill's Creek	10	424 920	4 779 245
8	Unnamed Trib of EF Coquille near Dora	10	423 150	4 779 020
9	Boone Creek	10	405 105	4 792 035
10	Unnamed Trib of lower Catching Creek	10	406 350	4 792 915
11	Unnamed Trib of upper Catching Creek	10	406 020	4 790 503
12	Unnamed Trib of EF Coquille @ MP 28.1	10	433 560	4 778 090
13	Unnamed Trib of EF Coquille @ MP 28.3	10	434 020	4 778 015
14	Unnamed Trib of EF Coquille @ MP 28.25	10	433 965	4 778 050
15	Unnamed Trib of Wilson Creek	10	408 455	4 791 070

Appendix C

AFTER RECORDING, RETURN TO:

U.S. Department of Justice
Environment and Natural Resources Division
Environmental Defense Section
P.O. Box 23986
Washington D.C. 20026-3986
Attn: Section Chief

MEMORANDUM OF CONSENT DECREE

COOS COUNTY, a County of the State of Oregon, and its agents and/or assigns (collectively, the "County"), is the holder of a grantee's interest (the "Easement Interest") under that certain Permanent Natural Gas Utility Pipeline Easement executed by _____, as grantor, in favor of the County, as grantee, dated _____, 200__, and recorded in the Official Records of _____ County, Oregon, affecting the real property described in Exhibit "A" attached hereto (the "Property"). Notice is hereby given that the Easement Interest only is encumbered and restricted by the terms of that certain Consent Decree between the United States of America (the "U.S.") and, among other parties, the County, dated _____, 2008, and entered by the United States District Court, District of Oregon in Civil Action No. 03-1697-HO and 06-6071-HO (the "Consent Decree"). The Consent Decree is not intended to encumber any real property interest owned by any party with respect to the Property except the Easement Interest.

Comment [tms1]: The names and dates to be inserted here will vary by each specific easement.

Comment [tms2]: This will either be Coos or Douglas County depending on the location of the easement.

The purpose of this Memorandum of Consent Decree is to achieve short form recording and give notice to third parties of the effect of the Consent Decree upon the Easement Interest only. A copy of the easement may be obtained without charge from Coos County (identify officer and location)

The County and the U.S. have executed this Memorandum as of the date first written above.

THE COUNTY: COOS COUNTY, a County of the State of Oregon

By:_____
Name:_____
Title:_____

U.S.: UNITED STATES OF AMERCA

By:_____
Name:_____
Title:_____

Appendix C

STATE OF OREGON)
) ss.
County of _____)

This instrument was acknowledged before me this _____ day of _____, 2008, by _____, the _____ of Coos County, a County of the State of Oregon, on behalf of such entity.

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires:_____

STATE OF OREGON)
) ss.
County of _____)

This instrument was acknowledged before me this _____ day of _____, 2008, by _____, the _____ of _____, the party who executed this instrument on behalf of the United States of America.

_____
NOTARY PUBLIC FOR OREGON
My Commission Expires:_____

Appendix C

EXHIBIT "A"

Legal Description

APPENDIX D

STREAM RESTORATION PLAN
COOS COUNTY NATURAL GAS PIPELINE
COOS AND DOUGLAS COUNTIES, OREGON

AUGUST 25, 2005

FOR
COOS COUNTY

GeoEngineers

File No. 2617-005-01

Stream Restoration Plan
Coos County Natural Gas Pipeline
Coos and Douglas Counties, Oregon
File No. 2617-005-01

August 25, 2005

Prepared for:

Coos County
1281 West Central
Coquille, Oregon 97423

Attention: Mr. Paul Slater

Prepared by:

GeoEngineers, Inc.
15055 SW Sequoia Parkway, Suite 140
Portland, Oregon 97224

EXPIRES: 6/30/07

Trevor N. Hoyles, P.E.
Senior Engineer

Timothy W. Blackwood, P.E., C.E.G.
Associate

Wayne S. Wright, PWS
Principal, Fisheries and Wetland Scientist

TNH:TWB:WSW:cje
Document ID: P:\2\2617005\01\Finals\Stream Restoration\261700501R Stream Restoration.doc

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STREAM RESTORATION PLAN
COOS COUNTY NATURAL GAS PIPELINE
COOS AND DOUGLAS COUNTIES, OREGON

1.0 INTRODUCTION AND BACKGROUND

This report presents our restoration plan for stream crossings within the Roseburg-Coos Bay natural gas pipeline Right-of-Way (ROW) in Coos and Douglas Counties, Oregon. The project included construction of roughly 88 miles of ROW for placement of the natural gas pipeline. Figure 1 presents a vicinity map of the pipeline corridor. Much of the ROW was constructed within cross country segments which included several ephemeral and perennial stream crossings. The erosion control and restoration specifications for the project presented in the Environmental Impact Statement (EIS), and as required by the Army Corps of Engineers (USACE), were not followed by the contractor which resulted in multiple impacts to stream crossings and unstable bank conditions. Because of these impacts, the USACE issued notices of non-compliance and cease and desist orders to Coos County as permitee of the project. A settlement agreement was reached between USACE and Coos County. GeoEngineers developed this restoration plan in accordance with the Memorandum of Agreement between USACE and Coos County which states the following:

- "Coos County shall undertake reasonable restoration of areas impacted by MasTec's construction activities and within 100 feet on either side of an affected tributary or jurisdictional area."
- "Restoration will include grade control within each channel's Ordinary High Water Mark (OHWM), riparian plantings within 30 horizontal feet (HF) from the OHWM, stream bank stabilization within 50 HF from the OHWM and slope erosion control within 100 HF from the OHWM."

The construction corridor includes 188 stream crossings identified in the EIS. The east end of the mainline begins near Roseburg, Oregon and utilizes the rights-of-way (ROW) of county roads, private property, Bureau of Land Management (BLM), the Bonneville Power Administration (BPA), Pacific Power and Light (PP&L) and the Coos Bay Wagon Road (CBWR) to its termination in Coos Bay, Oregon. Construction methods at stream crossings were selected according to guidelines presented in the EIS which included directional drilling, placing above or beneath culverts in roads, trenching using bag-and-flume methods, and attaching to bridges.

Streams impacted by construction were crossed using trenching techniques. Generally, the contractor did not restore streams in accordance with the project specifications and permits. Most streams which were trenched were leveled in order to create a working pad for trenching and installation of the pipeline. This earthwork often resulted in placement of fill within the portion of the stream channel that crossed the ROW. In many cases the contractor did not remove fill or recontour stream channels to pre-construction topography. Subsequent downcutting of the streams through the fill resulted in unstable channel geometry and unstable bank conditions as well as excessive sediment transport.

2.0 GENERAL SITE CONDITIONS

This section summarizes the typical condition of the trenched stream crossings that require restoration. Not including stream crossings under roads[1] (stream numbers 53-110, 123-169, 171-174.8, 186), the

[1] Coos County does not believe that further restoration work is required for these crossings and will provide documentation supporting its position to the Corps under separate cover.

USACE identified approximately 74 of the 188 EIS streams, an additional 18 along the Fairview lateral, and 33 previously unidentified streams that required restoration. The remaining EIS streams do not require restoration because they were crossed utilizing low impact methods described above and were either not impacted or only temporarily impacted during construction.

The trenched stream crossing beds have generally re-established themselves to natural grades. The substrate typically consists of fine-grained material similar to that which was observed within adjacent undisturbed channels. Stream banks are generally 2 to 4 feet high and vary in stability. Some of the banks are protected with erosion control fabric, but most have little to no erosion control. Vegetation at the stream crossings was typically sparse at the time of our reconnaissance and consisted of primarily short grasses and some alder saplings.

3.0 RESTORATION PLAN

This restoration plan addresses stream crossings that were determined to have been impacted by construction activities. Streams with bank heights over 4 feet high require a site specific grading plan which is not included in this general plan. The streams included in this restoration plan, and those identified as needing a site specific grading plan, are listed in appendix A.

The restoration plan includes four primary restoration elements: 1) stream bed grade control, 2) bank stabilization, 3) riparian vegetation restoration and 4) erosion control. Restoration objectives for each of these elements are presented in the following sections. Each stream crossing in this plan shall meet all of these objectives. Because the existing conditions at each crossing are unique, some of the restoration objectives may currently be satisfied. Prior to restoration construction, an on-site Representative as defined in Section 5.0 will document the existing conditions of all four elements, and determine which restoration elements will be necessary to achieve the objectives. The Representative will consult with the project manager to confirm the restoration elements to be implemented. Methodology for assessing compliance with objectives and selection of restoration elements by the Representative is discussed in the implementation section of this report. Appendix A summarizes the anticipated restoration elements that will be required at each crossing based on our preliminary site reconnaissance. However, variations may occur based on site conditions at the time of construction. Figure 2 presents a typical stream restoration diagram.

3.1 Stream Bed Grade Control

The stream bed geometry including width, length, and gradient shall be restored to preconstruction conditions based on adjacent, undisturbed reaches upstream and downstream of the impacted segment. Although most stream crossings have re-established natural grades that are consistent with the adjacent, undisturbed elevation of the stream bed, some fill material may remain in the channel. The presence and depth of fill shall be assessed by the Representative by measuring a longitudinal profile along the channel. Based on inferred preconstruction grade, the depth of fill can then be estimated.

If remaining fill is estimated to exceed 12 inches in depth or more than 2 cubic yards, the fill shall be removed in order to satisfy this restoration objective. Soils removed from the channel shall be placed in thin lifts in a stable area of the site as specified in Appendix B.

Where conditions such as channel incision or severe erosion indicate the need for grade control structures, a site specific restoration plan shall be developed under the direction of the project manager. Grade control structures will likely include the use of woody debris.

3.2 Bank Regrading and Stabilization

Stream banks that were impacted by pipeline construction activities shall be stable and not affected by slumping or mass failure. Banks shall be considered unstable if they have been affected by mass failure (slumping) or if they are inclined at a gradient steeper than 1H:1V, and there is significant potential for future mass wasting, if left unmitigated.

Regrading unstable and/or oversteepened fill banks to a more gentle gradient will improve their stability and provide a surface that is adequate for proper installation of erosion control and planting of riparian species. Unstable and/or oversteepened stream banks shall be mitigated by regrading and/or recompaction of the soils depending on the consistency of the soils and the site specific conditions. Prior to construction, the stream banks shall be evaluated by the on-site Representative to select the appropriate stabilization methods in accordance with the following criteria:

- If unstable and oversteepened bank soils are found to be loose as indicated by a probing depth of 2 feet or more, the bank soils shall be removed, recompacted and the banks shall be regraded to a maximum inclination of 2H:1V.

- If unstable and/or oversteepened bank soils are not found to be loose as indicated by probing, the banks shall be regraded to a maximum inclination of 2H:1V without additional compaction.

- If the unstable and/or oversteepened bank soils are not found to be loose but they cannot be regraded to a maximum gradient of 2H:1V due to adjacent gradients exceeding 2H:1V, the bank soils shall be recompacted and the banks shall be regraded to a maximum of 1H:1V, or to match adjacent banks, whichever is less.

All soils excavated from the stream banks shall be spread on a stable area of the site in a thin lift in accordance with the earthwork specifications presented in Appendix B. Figure 2 shows a typical diagram of the bank conditions before and after regrading. Specifications for bank regrading and stabilization are presented in the attached earthwork specifications, Appendix B. Appendix A lists those streams where unstable and/or oversteepened conditions have been observed and we anticipate bank regrading will be required.

3.3 Erosion Control

Erosion control measures shall be implemented within 100 horizontal feet of the OHWM, where soils are disturbed or exposed. Erosion control shall include the use of erosion control fabric, straw wattles, coir fiber rolls, and seeding and mulching. All erosion control measures shall be placed in accordance with the specifications presented in Appendix D. A typical configuration of erosion control measures is shown on Figure D-1. If earthwork is required at the stream crossing, erosion control Best Management Practices (BMP's) shall be installed immediately after completion of earthwork activities.

3.4 Riparian Vegetation Restoration

Vegetation will be restored to pre-construction conditions within 30 feet of the OHWM as determined by species present along adjacent undisturbed riparian areas. The quantity and type of species to be restored at each crossing will be based on a survey of the density and distribution of species in the adjacent undisturbed areas performed by the on-site Representative in accordance with specifications presented in Appendix C. Appendix C also describes the native riparian species that we anticipate will be encountered in the project area and used for restoration. The quantity and type of species to be planted may be subject

to land owner requirements. Upon receiving notice that land owner requirements may necessitate deviation from this restoration plan, Coos County will notify the Corps and attempt to reach an agreement on the quantity and species of plants at a given site. Nothing in this plan requires Coos County to undertake any plantings that will expose it to claims or liability from a land owner.

In areas where little to no native riparian species is present, the stream banks may need to be planted with approved native species for stability purposes. Disturbed and/or exposed soil shall be seeded with the native grass mix as specified in Appendix C. The grasses will be utilized as ground cover to slow the erosion of topsoil until the native shrubs and trees can be permanently established.

4.0 IMPLEMENTATION

Prior to beginning restoration, each site shall be visited by the Representative to assess existing conditions and to determine the necessary restoration elements in order to meet the objectives presented in this plan. If the Representative determines that restoration is beyond the scope of this report, then a site specific restoration plan shall be developed.

The Representative will assess existing conditions with respect to the four restoration elements in the following order:

1. Perform adjacent riparian plant survey and sketch density and distribution of species for planting plan in accordance with Section 3.4.
2. Observe existing soil cover and assess erosion control BMP's necessary to stabilize exposed soils and prevent future erosion and/or sediment delivery to the stream.
3. Perform longitudinal survey along the channel to estimate the presence and/or depth of fill within the channel in accordance with section 3.1.
4. Measure the gradient and assess the stability of the stream banks in accordance with Section 3.2 of this report.
5. Based on the existing conditions, the Representative shall determine the restoration elements required to meet the objectives. Recommendations for restoration shall then be summarized on a field report and a site sketch shall be provided with details as necessary to illustrate recommendations.

The recommendations summarized in the field report shall be implemented by the contractor as follows:

- Install sediment control BMP's in accordance with Appendix D prior to construction activities. If earthwork conflicts with installation of silt fence, check dams shall be placed within the channel at the down stream edge of the ROW to reduce potential sediment transport off site. Most streams are ephemeral and will likely be dry at the time of restoration. If channel restoration is necessary and significant flow is present at the time of work, the stream should be routed around the work area by bag and flume methods prior to beginning work.
- If necessary, channel restoration and bank regrading should then be completed as described in Sections 3.1 and 3.2. After completion of earthwork, erosion control BMP's shall be installed as described in Section 3.3. All exposed soil shall be seeded with the native grass mix as specified in Appendix C prior to placement of erosion control.

- Riparian plants shall then be planted in accordance with the planting plan developed on site. Because we consider irrigation not feasible, riparian plants shall be planted either from February to March or from October to November, in order to minimize mortality.

5.0 CONSTRUCTION OBSERVATION

Implementation of the plan will be ensured by adequate construction observation performed by a trained on-site Representative under the direction of a project manager who is a licensed professional. The Representative shall perform construction observation in order to confirm that the objectives of the restoration elements are satisfied in accordance with the specifications and the intent of this plan. Given the time that has passed since the impacts discussed in this report have occurred, site specific adjustments to the restoration elements are anticipated. The Representative will modify the plan as necessary under the supervision of the project manager to achieve restoration objectives. The project manager shall be a civil engineer or engineering geologist and will consult with a biologist or wetlands scientist for the riparian planting aspects of the project.

All observations shall be accompanied by daily field reports and photo documentation of the items being observed. All reports shall be reviewed the by the qualified professional.

6.0 MONITORING PLAN

One year after restoration each site shall be visited to observe bank stability and mortality of the planted native species. Existing conditions shall be documented by photograph and daily field reports. Each tree and shrub species shall be counted and the health of the plant community shall be noted. The vegetation should be examined for signs of drought stress and any plant mortality shall be recorded. The vegetative cover, as well as the coverage of bare ground and invasive species, shall also be estimated. A summary report of this monitoring event including recommendations for additional restoration, if needed, shall be forwarded to Coos County. Conditions shall be reassessed three years after initial restoration activities, and the following success criteria shall apply to each site:

- Stream channel and banks shall be stable with no indicators of active mass wasting.
- The density of native vegetation at each restored stream crossing must be equal to 80 percent or greater of the established baseline from the adjacent area.
- Total aerial coverage of seeded groundcover is equal to or greater than 90 percent.

Corrective measures should be taken if any of the three success criteria above are not met. If there is a significant problem with the mitigation achieving its success criteria, a contingency plan will be developed. The contingency plan can include, but is not limited to: additional plant installation, modifications to hydrology (possibly through irrigation), and plant substitutions of type, size, quantity, and location.

7.0 LIMITATIONS

This report has been prepared for the exclusive use of the Coos County for the Coos County pipeline construction corridor stream restoration project. This report is not intended for use by others, and the information contained herein is not applicable to other sites. No other party may rely on the product of our services unless we agree in advance and in writing to such reliance.

Within the limitations of scope, schedule and budget, our services have been executed in accordance with generally accepted environmental science practices in this area at the time this report was prepared. No warranty or other conditions, express or implied, shall be understood.

Any electronic form, facsimile or hard copy of the original document (email, text, table, and/or figure), if provided, and any attachments are only a copy of the original document. The original document is stored by GeoEngineers, Inc. and will serve as the official document of record.

8.0 REFERENCES

Cooke, Sarah Spear, ed. 1997. A Field Guide to the Common Wetland Plants of Western Washington and Northwest Oregon. Seattle: Seattle Audubon Society, 417 pp.

Crane, M. F. 1989. Cornus sericea. In: Fire Effects Information System, [Online].

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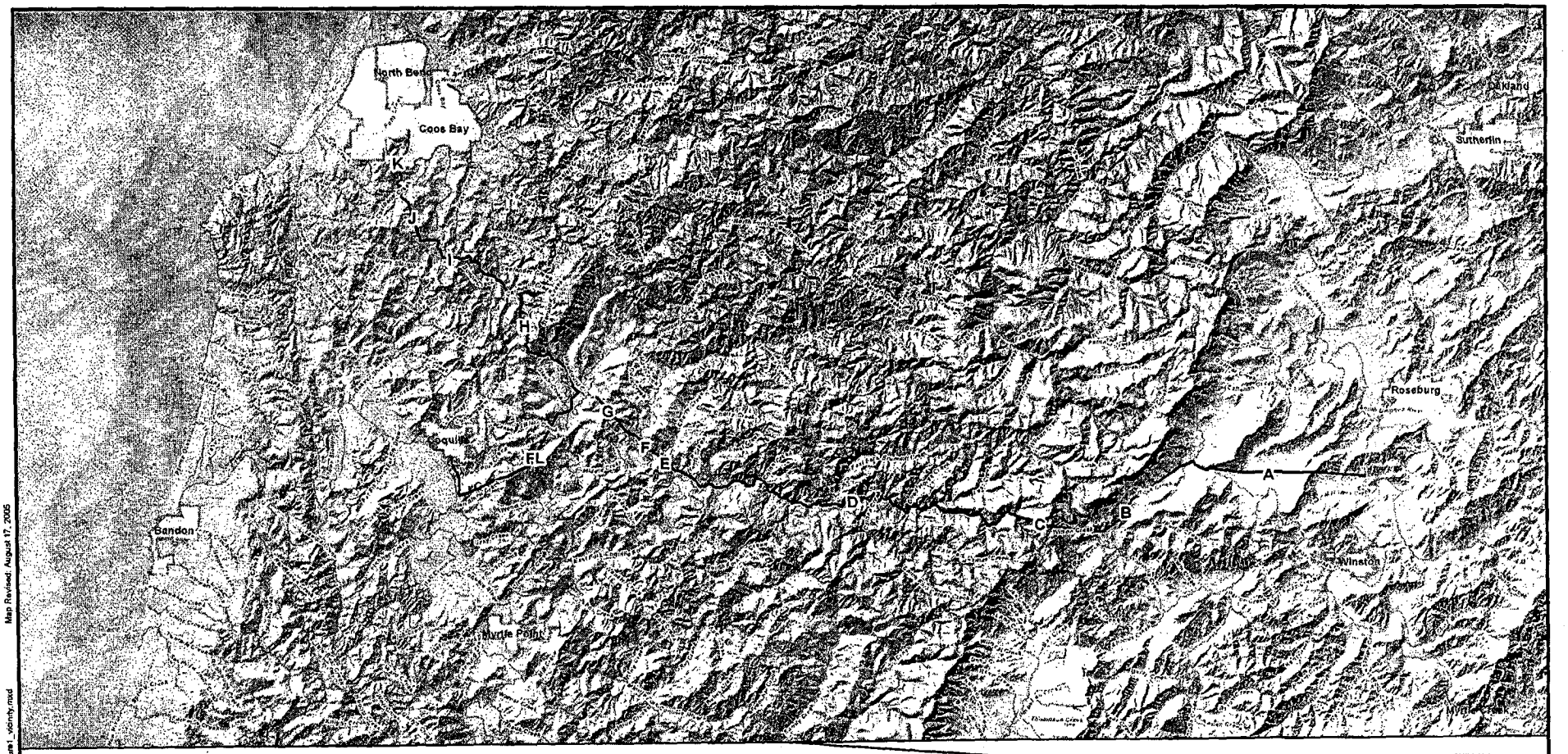
U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Fire Sciences Laboratory (Producer). Available: http://www.fs.fed.us/database/feis/ [2005, February 16].

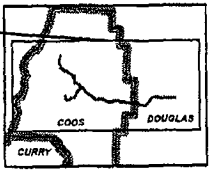


Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates).
Rivers from Oregon Water Resources Department.
USGS quadrangle (4 meter resolution) from TerraServer obtained November 2004. Hillshade from USGS National Elevation Data set (obtained November 2004).

All locations are approximate.

PIPELINE SEGMENTS
RIVERS
COAST
CITY BOUNDARIES

0 2 4 Miles



Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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VICINITY MAP

FIGURE 1

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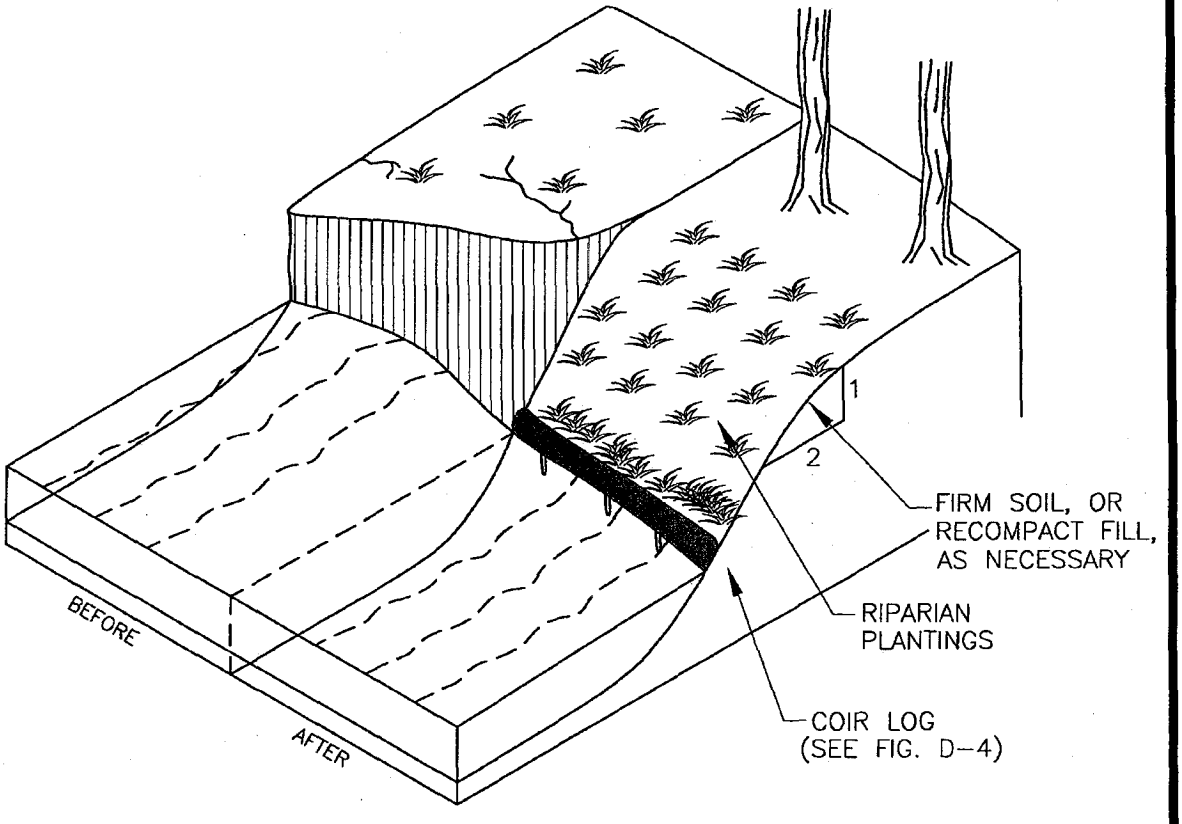

Reference: Diagram provided by USACE.

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TYPICAL STREAM RESTORATION DIAGRAM

FIGURE 2

Portland\P:\2\2617005\01\Cad\HabRes\Figures1 and 2.dwg TNH:MWJ 08/18/05

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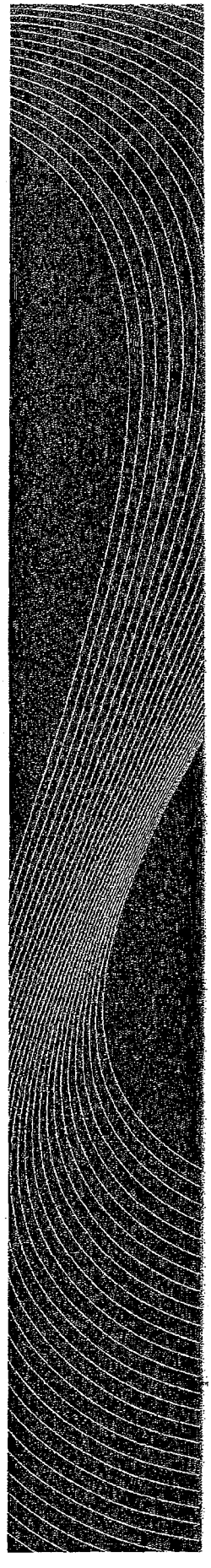


APPENDIX A

STREAM CROSSINGS TO BE RESTORED

APPENDIX A
STREAM LISTINGS

Table A-1 provides a list of the stream crossings to be included in this restoration plan and the anticipated restoration elements for each stream crossing. The locations of the stream crossings are presented in Figures A-1 through A-17. Selection of restoration elements will be reassessed in the field by a Representative of the qualified professional. Table A-2 provides a list of the streams that will require a site specific grading plan because of complex site conditions such as unstable banks exceeding 4 feet in height.

Table A-1. Stream Crossings to Be Restored Under this Plan

Stream No.	Segment	Channel Width Restoration	Bank Stabilization	Planting	Erosion control
1 wetland (wet w. of 1)	A			X	
2 (1st trib w. of 1)	A	X	X	X	X
2.4 (drainage to 1st trib)	A			X	X
2.9 (2nd trib w of 1)	A			X	X
3	A			X	X
3a (UT w. of 3)	A		X	X	X
3 wetland (wet. W. of 3)	A			X	
4.7	A			X	
5	A	X	X	X	X
6	A			X	X
6.5 (wetland w of 6)	A	X	X	X	X
7	A	X	X	X	X
8	A			X	X
9	A	X	X	X	X
10	A	X	X	X	X
11	A			X	
12	A			X	X
13	A			X	X
14	A	X	X	X	X
15	A	X	X	X	X
17	A	X	X	X	X
18	A	X	X	X	X
19	A			X	N
20	A			X	X
21	A	X	X	X	X

Stream No.	Segment	Channel Width Restoration	Bank Stabilization	Planting	Erosion control
25	A			X	X
27	B			X	X
30	B	X	X	X	X
33	B	X	X	X	X
34	B	X	X	X	X
34.5 (trib 1 sw of 34)	B		X	X	X
34.5a (trib 2 sw of 34)	B		X	X	X
35	B	X	X	X	X
36	B			X	X
37	B			X	X
38	B	X	X	X	X
38a (trib 1 sw of 38)	B			X	X
38.2 (trib 2 sw of 38)	B			X	X
40	B	X	X	X	X
41	B	X	X	X	X
42	B	X	X	X	X
43	B	X	X	X	X
44	B			X	X
45	B	X	X	X	X
46	B			X	X
47	B			X	X
48	B	X	X	X	X
50	C			X	X
51	C	X	X	X	X
52	C			X	X
111	E	X	X	X	X
112	E	X	X	X	X
112.3 (UT btwn 112-113)	E			X	X
113	E			X	X
114	F				X
115	G			X	
117	G			X	X
118	G			X	X
119	G			X	X
120	G			X	X
121	G				X

Stream No.	Segment	Channel Width Restoration	Bank Stabilization	Planting	Erosion control
122	H			X	X
170	H			X	X
175	I			X	X
177a (water s. of 177)	J			X	
177	J	X	X	X	X
177b (culvert s. of 177)	J			X	X
178	J	X	X	X	X
179	J	X	X	X	X
180	J				X
180 wetland 1 (shingle 1)	J			X	X
180 wetland 2 (shingle 2)	J			X	X
180 wetland 3 (shingle 3)	J			X	X
181	J			X	X
181a (trib n. of 181)	J			X	X
182a (trib s. of 182)	J			X	X
185.9 wetland	J			X	X
186	K	X	X	X	X
186a	K			X	X
187	K	X	X	X	X
188	K		X	X	X
188a (w. draw s of trib 2 to 188)	K			X	X
188b (trib 2 s of 188)	K			X	X
188c (trib 1 s. of 188)	K			X	X
188d (trib to 188)	K			X	X
Cemetery Lane Wetland	FL	NA	NA	NA	NA
FLW01	FL	NA	NA	NA	NA
FLS10	FL	NA	NA	NA	NA
FLS12	FL	NA	NA	NA	NA
Glen Aiken-Adj. Wetland	FL	NA	NA	NA	NA

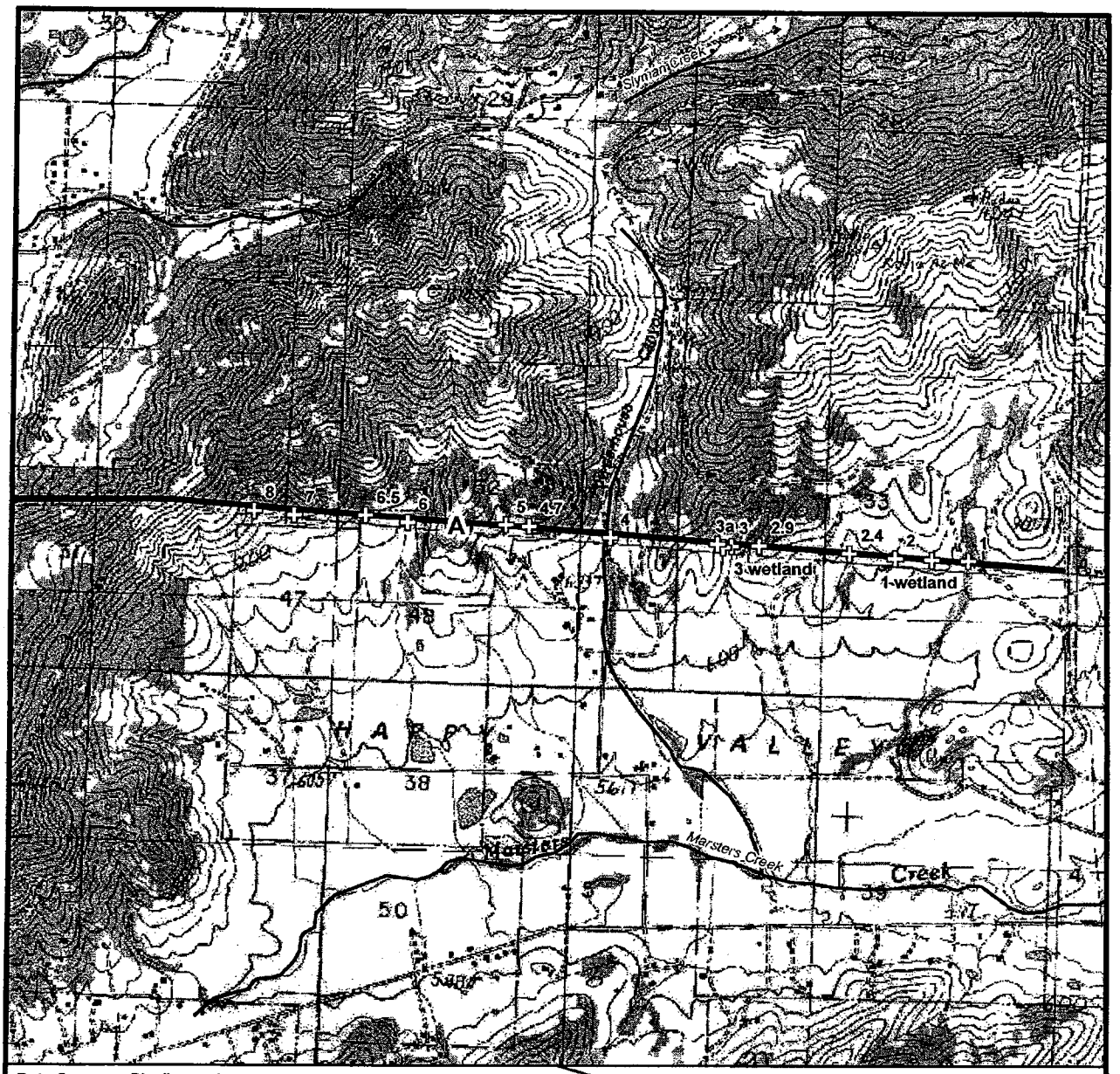
Stream No.	Segment	Channel Width Restoration	Bank Stabilization	Planting	Erosion control
GA Trib 1	FL	NA	NA	NA	NA
GA Trib 2	FL	NA	NA	NA	NA
FLS18	FL			X	X
FLS19	FL		X	X	X
FLS20	FL			X	X
FLS21	FL			X	X
FLS23	FL		X	X	X
FLS24	FL			X	X
RRWET1	FL	NA	NA	NA	NA
RRWET2	FL	NA	NA	NA	NA
RRWET3	FL	NA	NA	NA	NA
RRWET4	FL	NA	NA	NA	NA
RRWET5	FL	NA	NA	NA	NA

Note: NA indicates that these locations have not been observed and therefore the anticipated restoration elements are unknown.

Table A-2. Summary of Stream Crossings Needing a Site Specific Restoration Plan

Stream No.	Segment	Channel Width Restoration	Bank Stabilization	Seeding/Planting	Erosion Control
1	A	X	X	X	X
4	A	X	X	X	X
16	A	X	X	X	X
23	A	X	X	X	X
26	B	X	X	X	X
28	B	X	X	X	X
29	B	X	X	X	X
31	B	X	X	X	X
32 (including 32a-trib NE and 32b-channel SW)	B	X	X	X	X
39 (a,b,c)	B	X	X	X	X
49	B	X	X	X	X

Stream No.	Segment	Channel Width Restoration	Bank Stabilization	Seeding/Planting	Erosion Control
49a (trib 1 w. of 49)	C	X	X	X	X
49.5 (trib 2 w of 49)	C	X	X	X	X
49.5 wetland (adj to trib 2)	C	X	X	X	X
49b (trib 3 w. of 49)	C	X	X	X	X
49c (UT between 49-50)	C	X	X	X	X
116	G	X	X	X	X
182	J	X	X	X	X
183	J	X	X	X	X



Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates). Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment A
Other Segments

Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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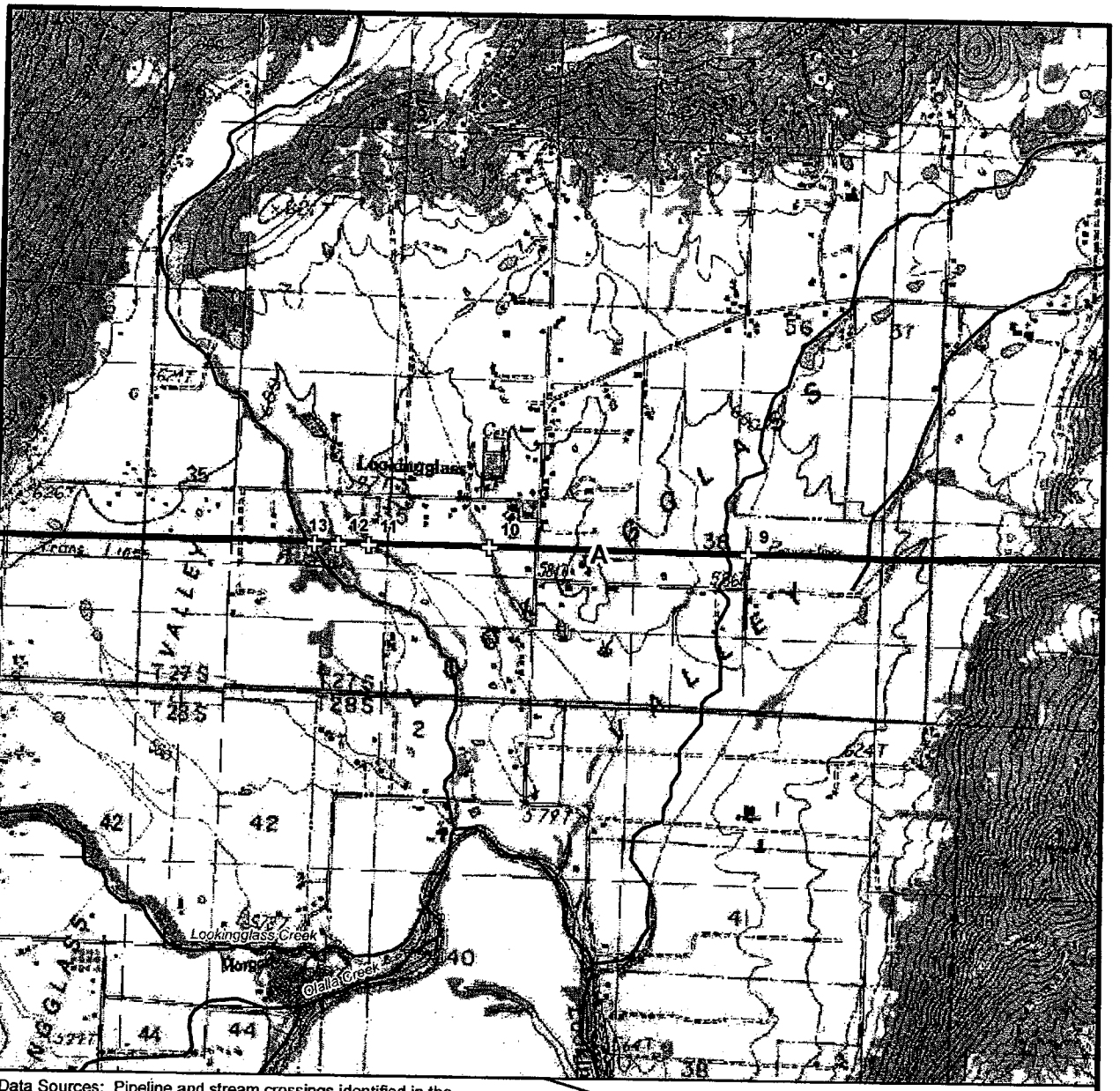
STREAMS 1 THROUGH 8

FIGURE A1



Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates).
Streams from Oregon Water Resources Department.
USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment A
Other Segments

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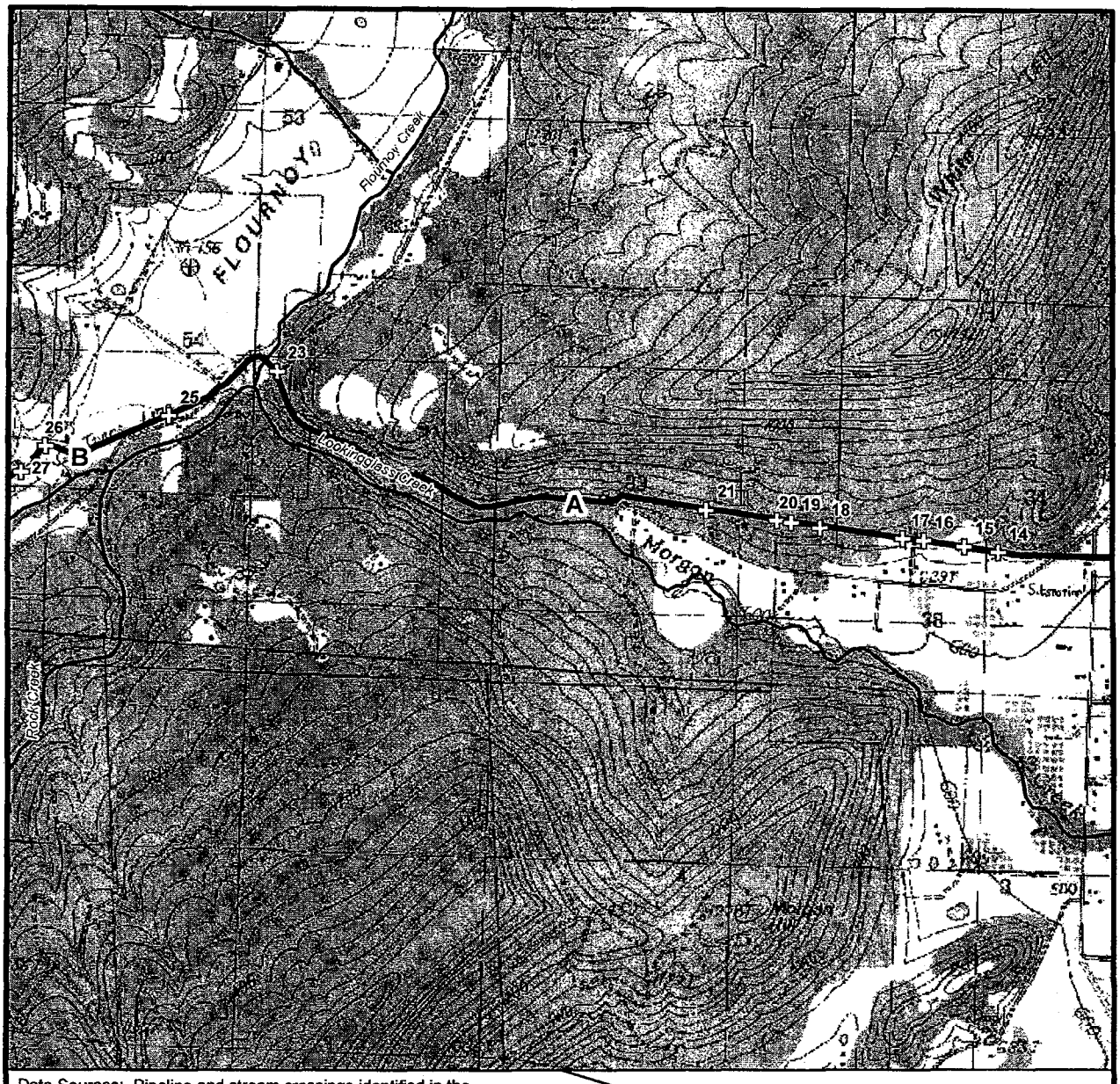
STREAMS 9 THROUGH 13

FIGURE A2



Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates). Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment A
Other Segments

Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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STREAMS 14 THROUGH 27

FIGURE A3

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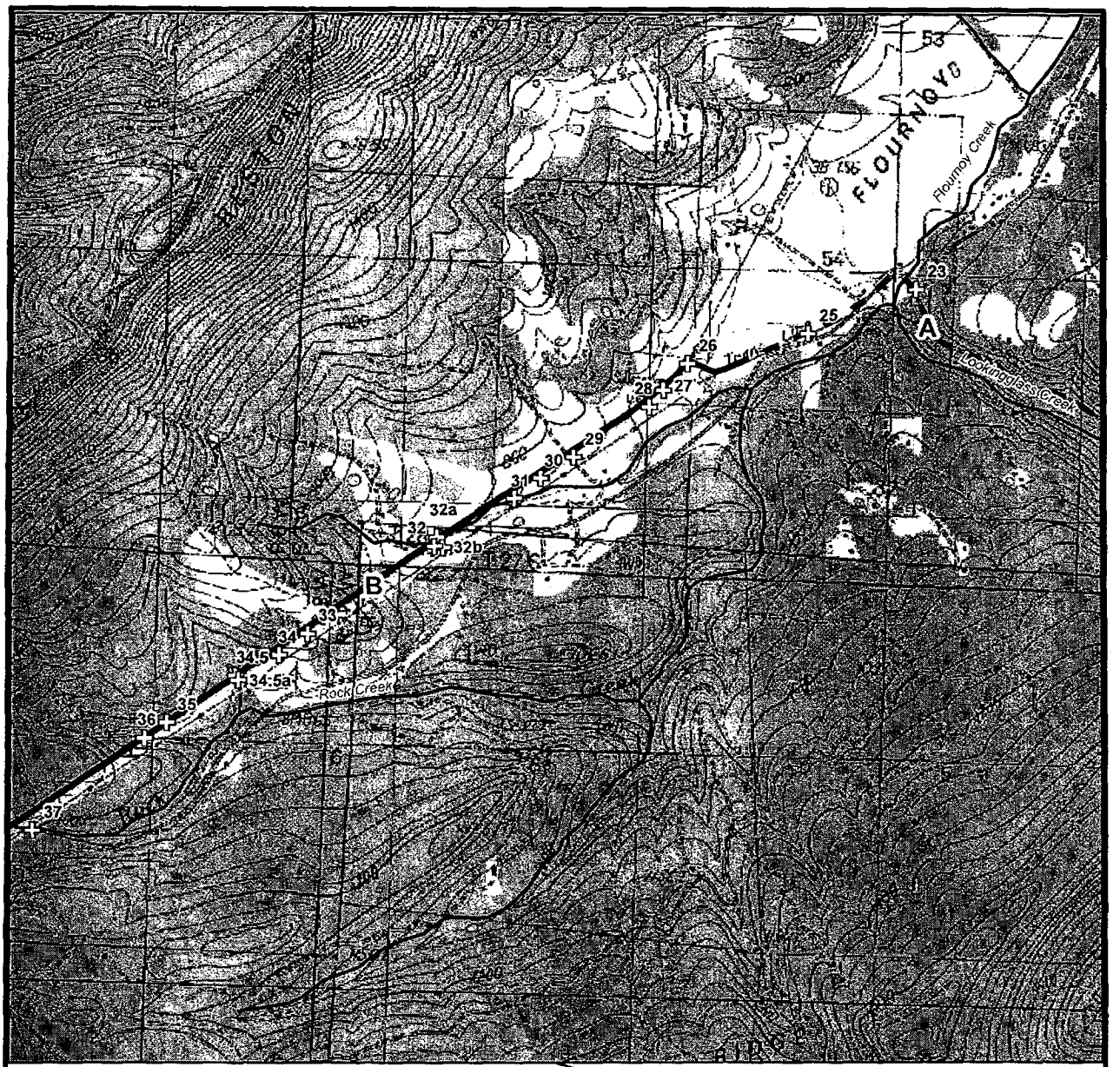
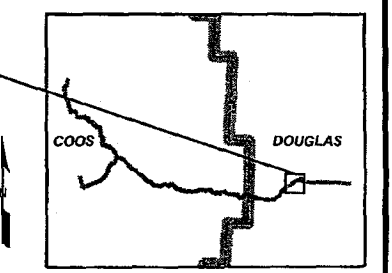


Data Sources: Pipeline and stream crossings from NW Economics Associates. Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment FL
Other Segments



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STREAMS 23 THROUGH 37

FIGURE A4

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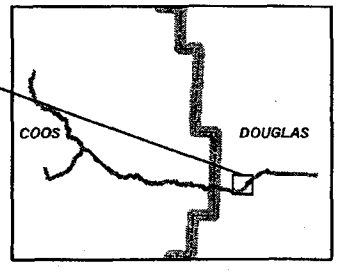
Data Sources: Pipeline and stream crossings from NW Economics Associates. Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment FL
Other Segments



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STREAMS 37 THROUGH 49A

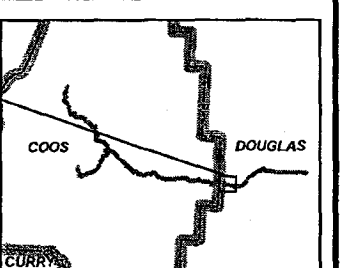
FIGURE A5

Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates). Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment C
Other Segments



Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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STREAMS 49A THROUGH 52

FIGURE A6

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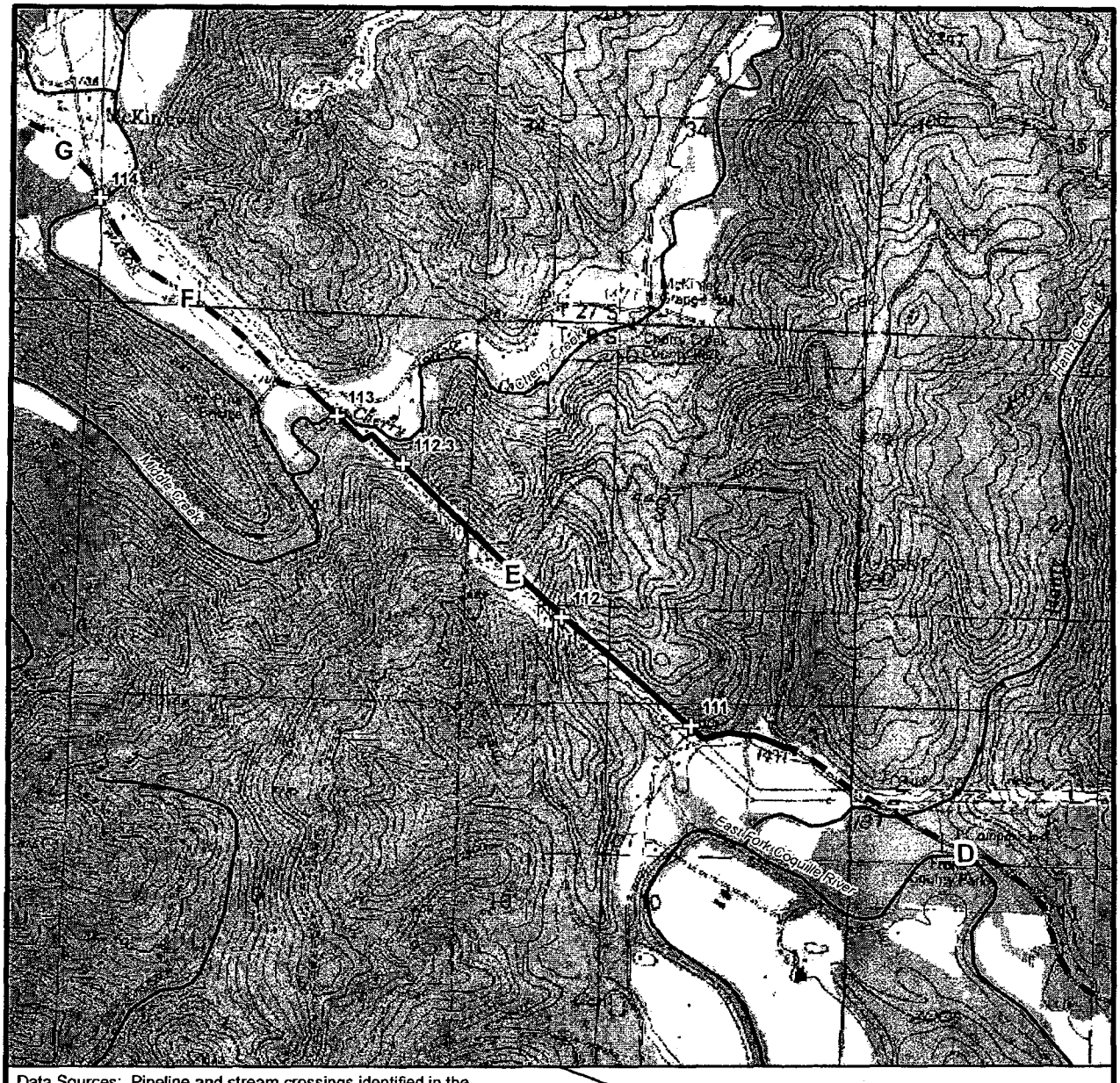

Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates). Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment E
Other Segments

Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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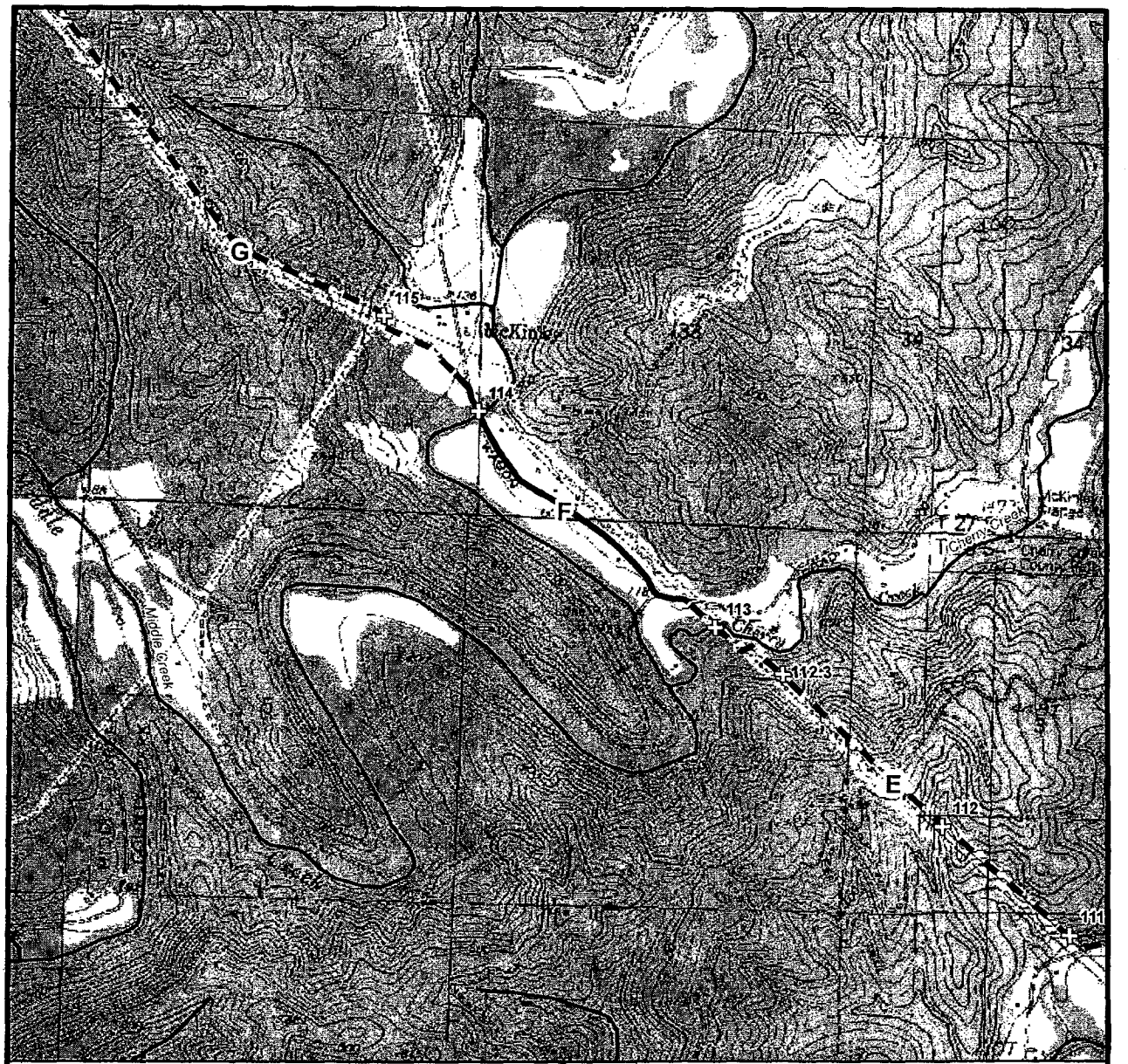
STREAMS 111 THROUGH 114

FIGURE A7

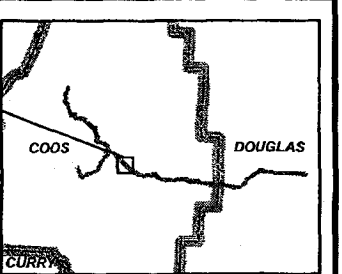


Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates). Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment F
Other Segments



Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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STREAMS 111 THROUGH 115

FIGURE A8

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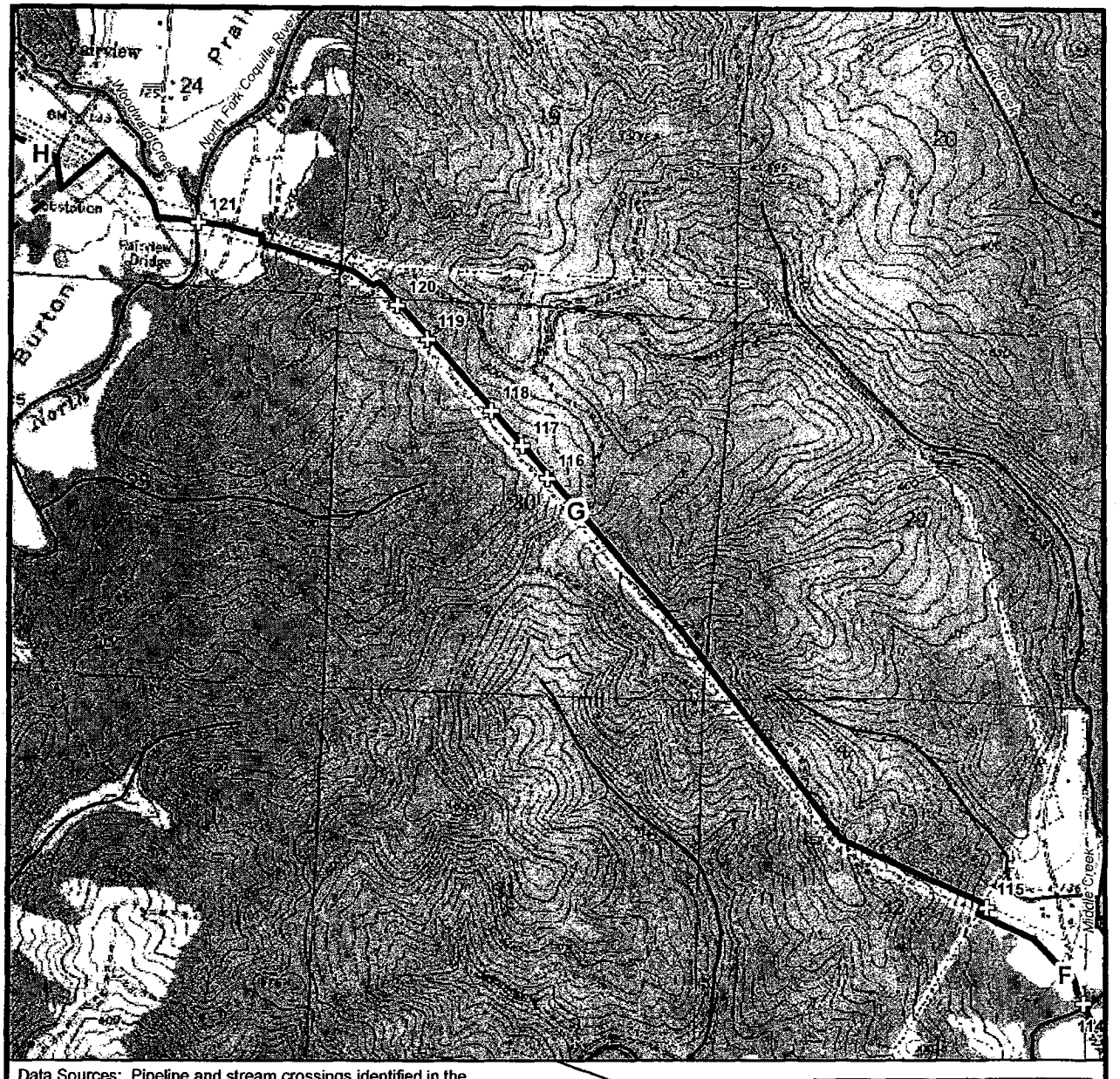
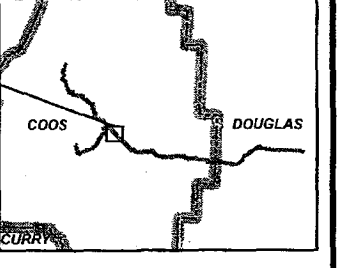


Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates). Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment G
Other Segments



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Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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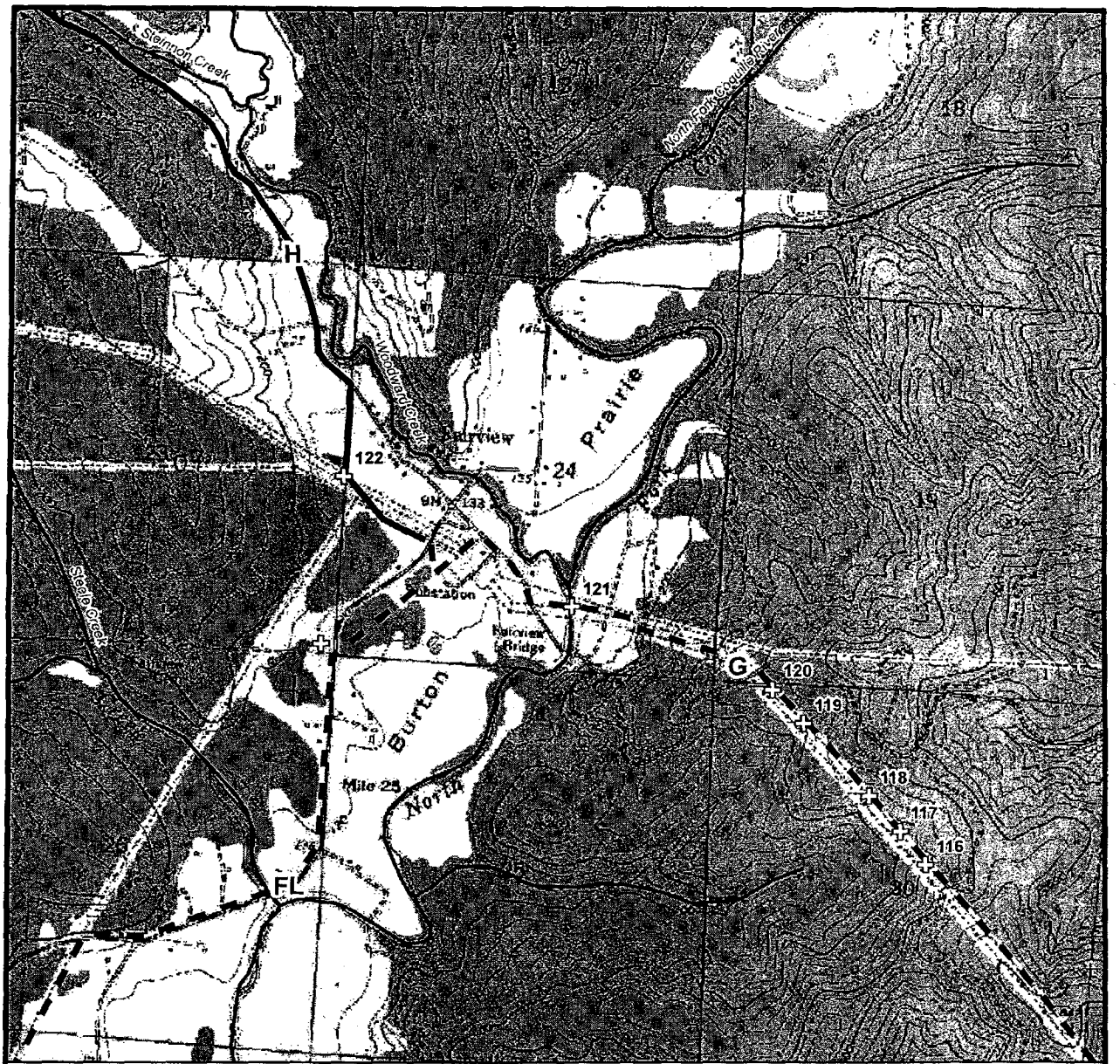
STREAMS 114 THROUGH 121

FIGURE A9



Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates). Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment H
Other Segments

Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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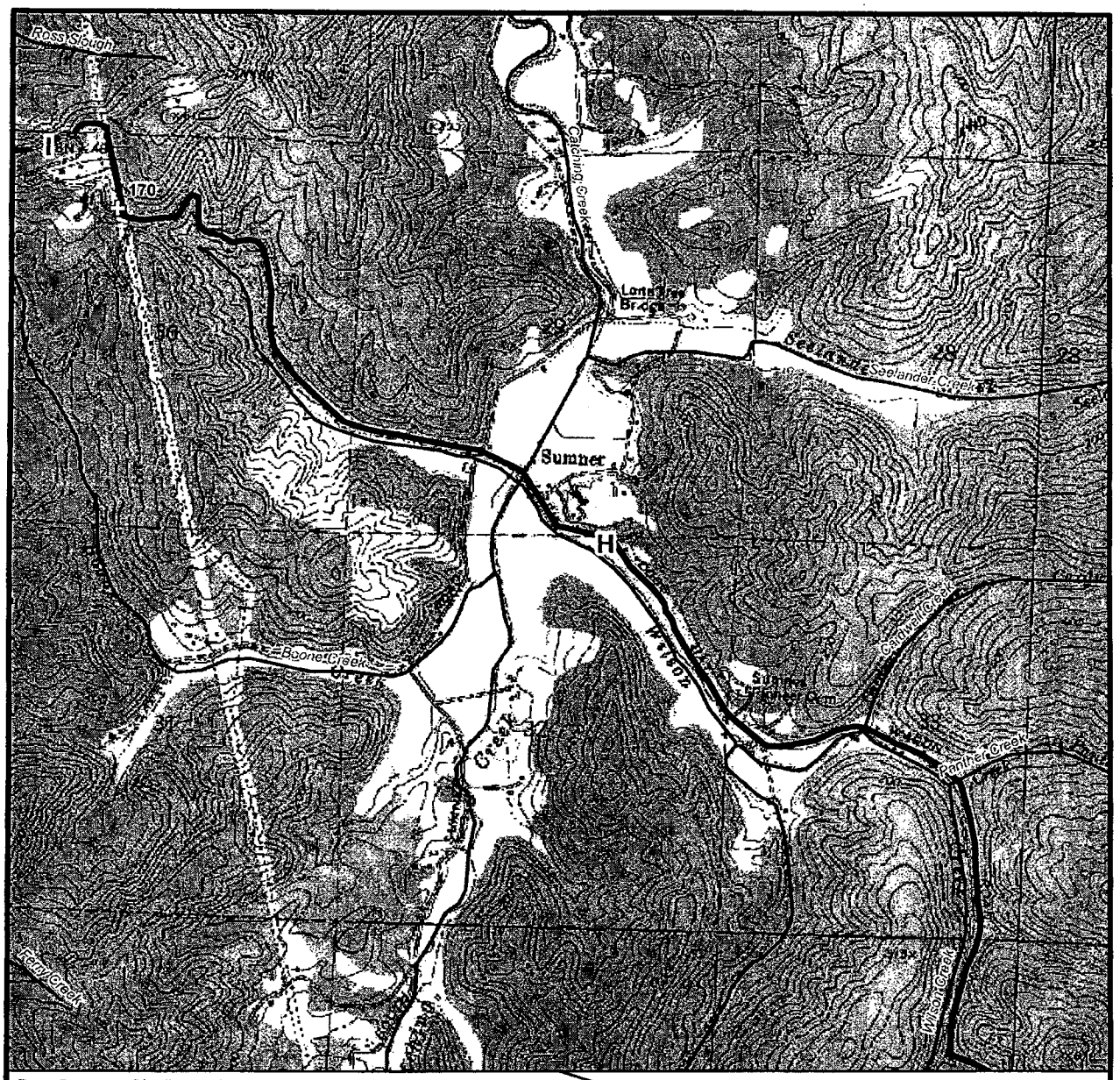
STREAMS 116 THROUGH 122

FIGURE A10



Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates). Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment H
Other Segments

Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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STREAM 170

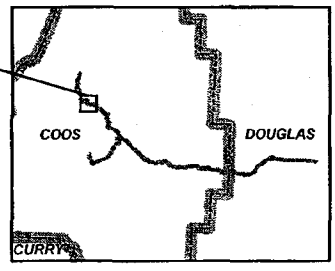
FIGURE A11

Data Sources: Pipeline and stream crossings identified in the Environmental Impact Statement (NW Economics Associates). Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment I
Other Segments



Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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STREAMS 170 THROUGH 179

FIGURE A12

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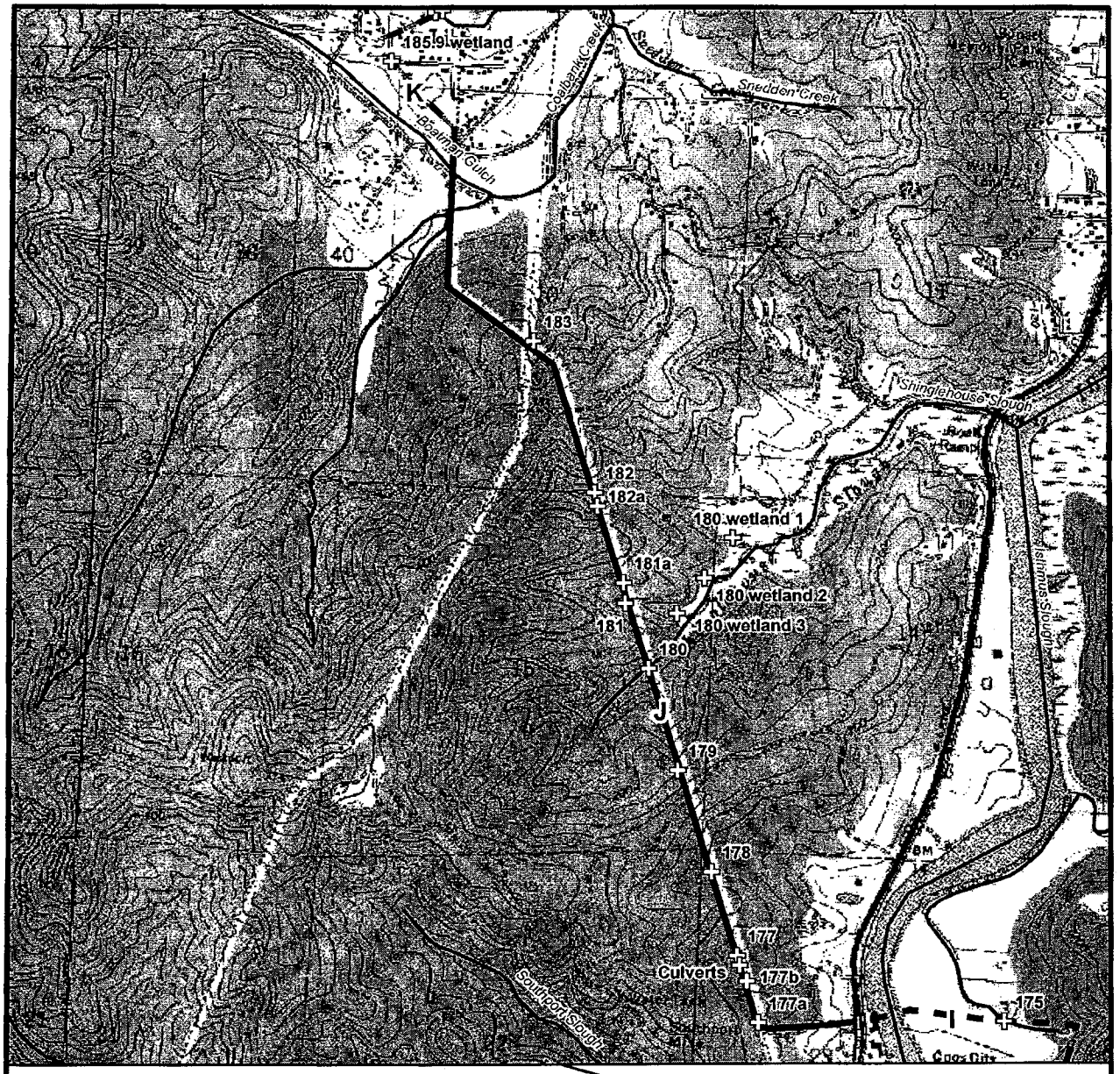

Data Sources: Pipeline and stream crossings from NW Economics Associates. Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment J
Other Segments

Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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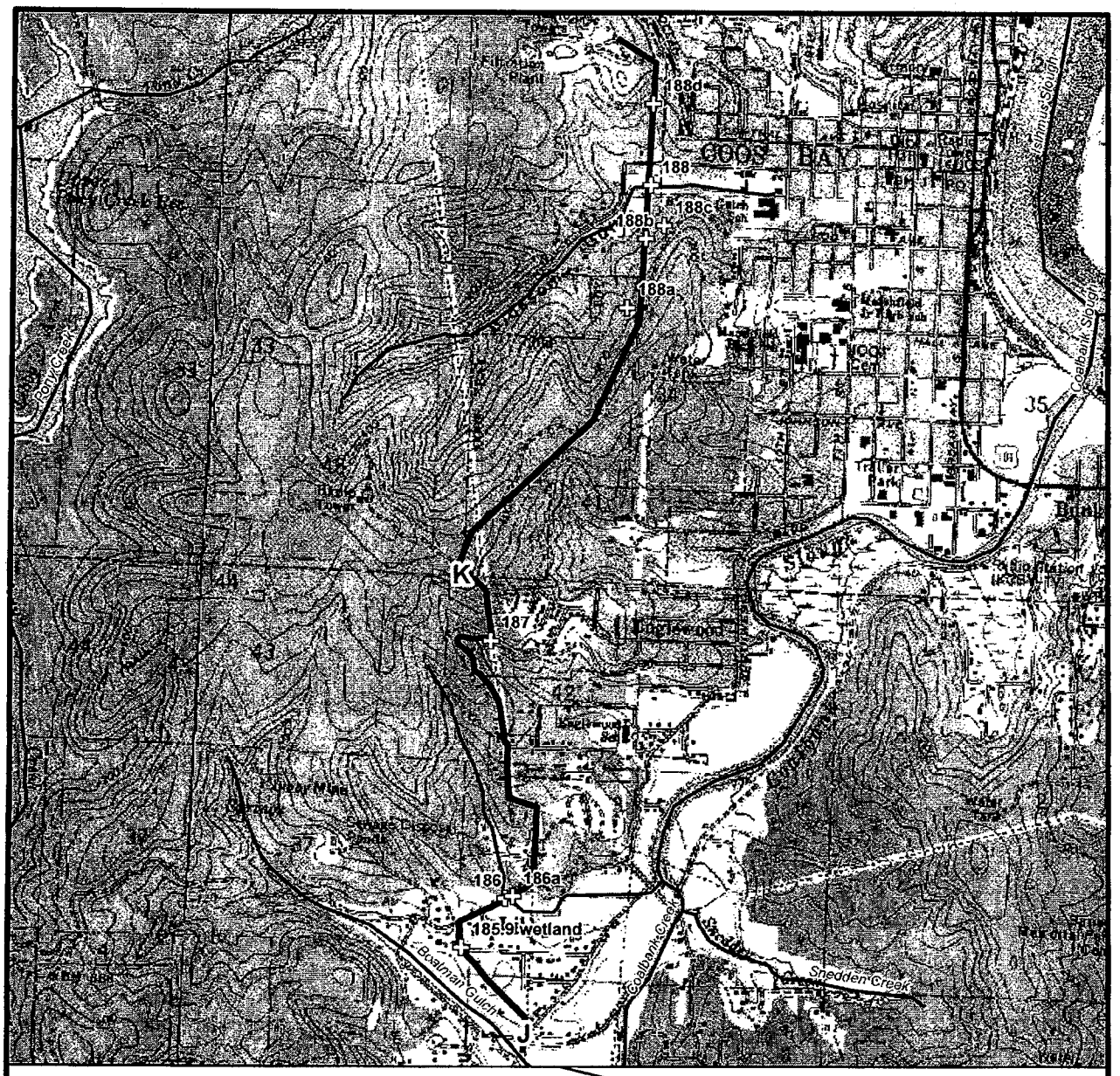
STREAMS 175 THROUGH 185.9 WETLAND

FIGURE A13

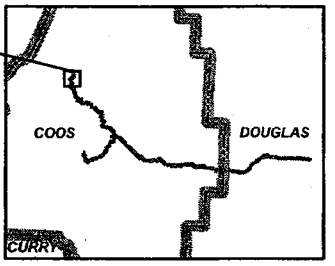


Data Sources: Pipeline and stream crossings from NW Economics Associates. Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment K
Other Segments



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Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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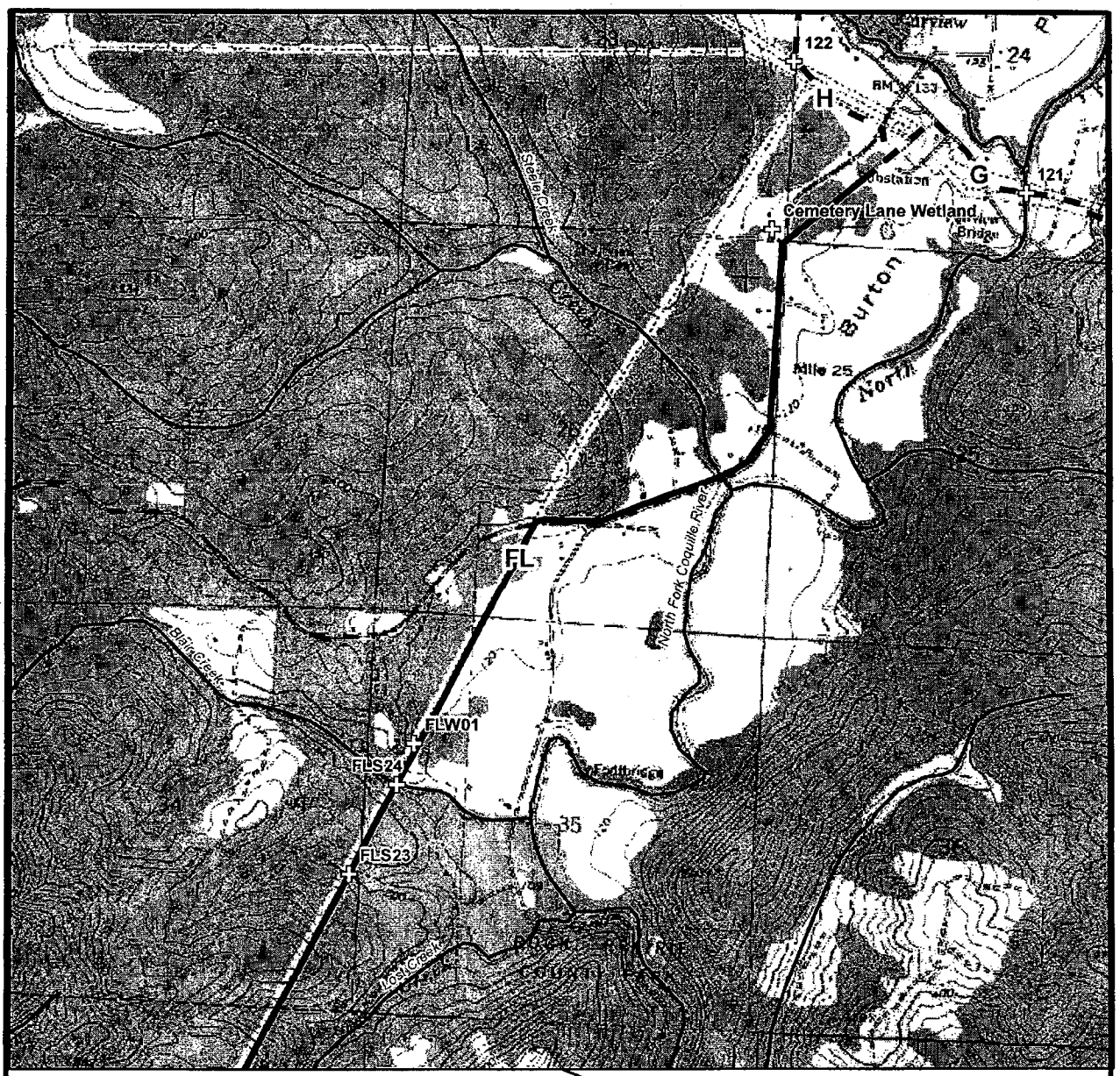
STREAMS 185.9 WETLAND THROUGH 188D

FIGURE A14



Data Sources: Pipeline and stream crossings from NW Economics Associates. Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment FL
Other Segments

Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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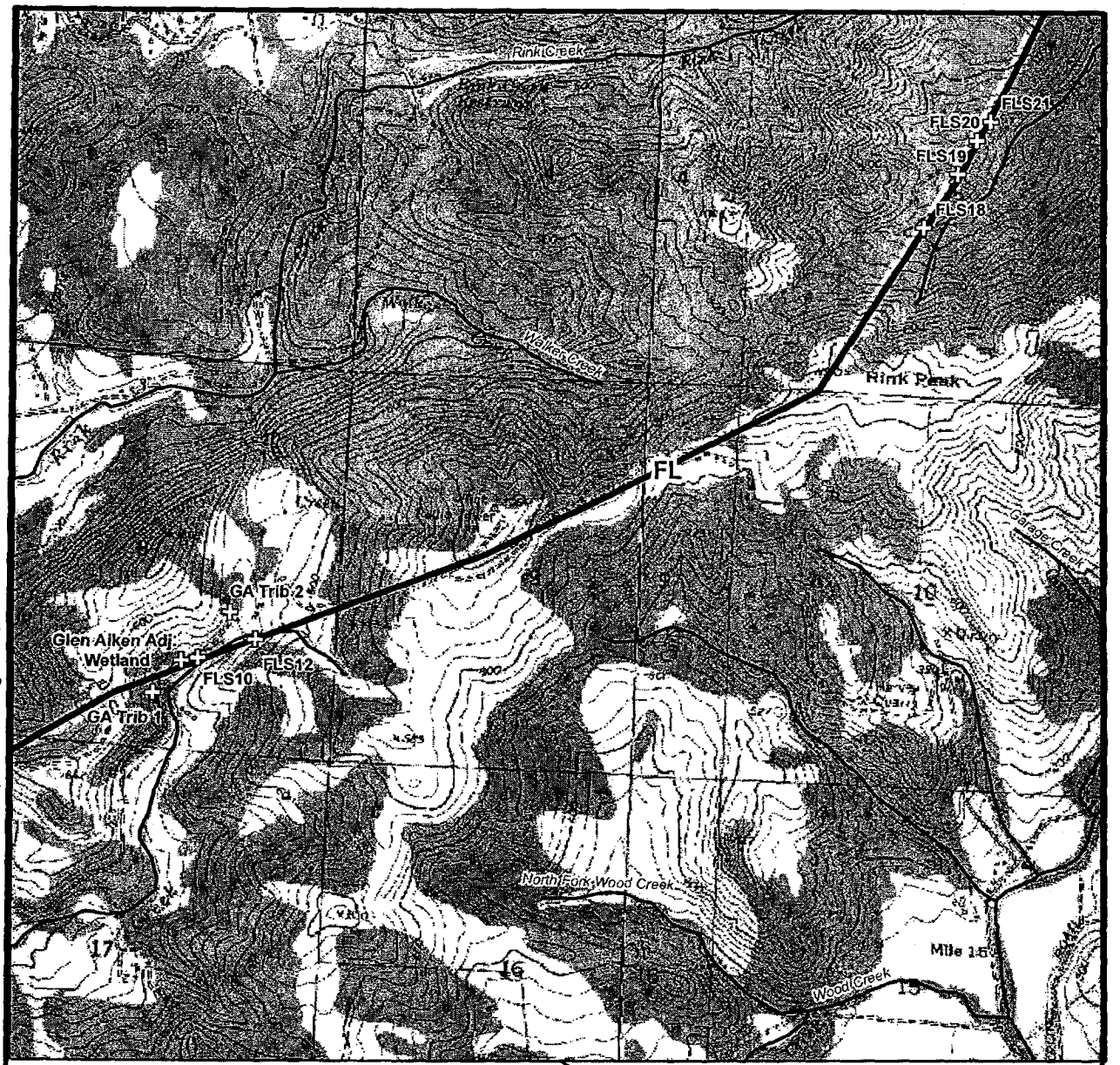
FAIRVIEW LATERAL

FIGURE A15



Data Sources: Pipeline and stream crossings from NW Economics Associates. Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment FL
Other Segments

Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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Map Revised: August 18, 2005

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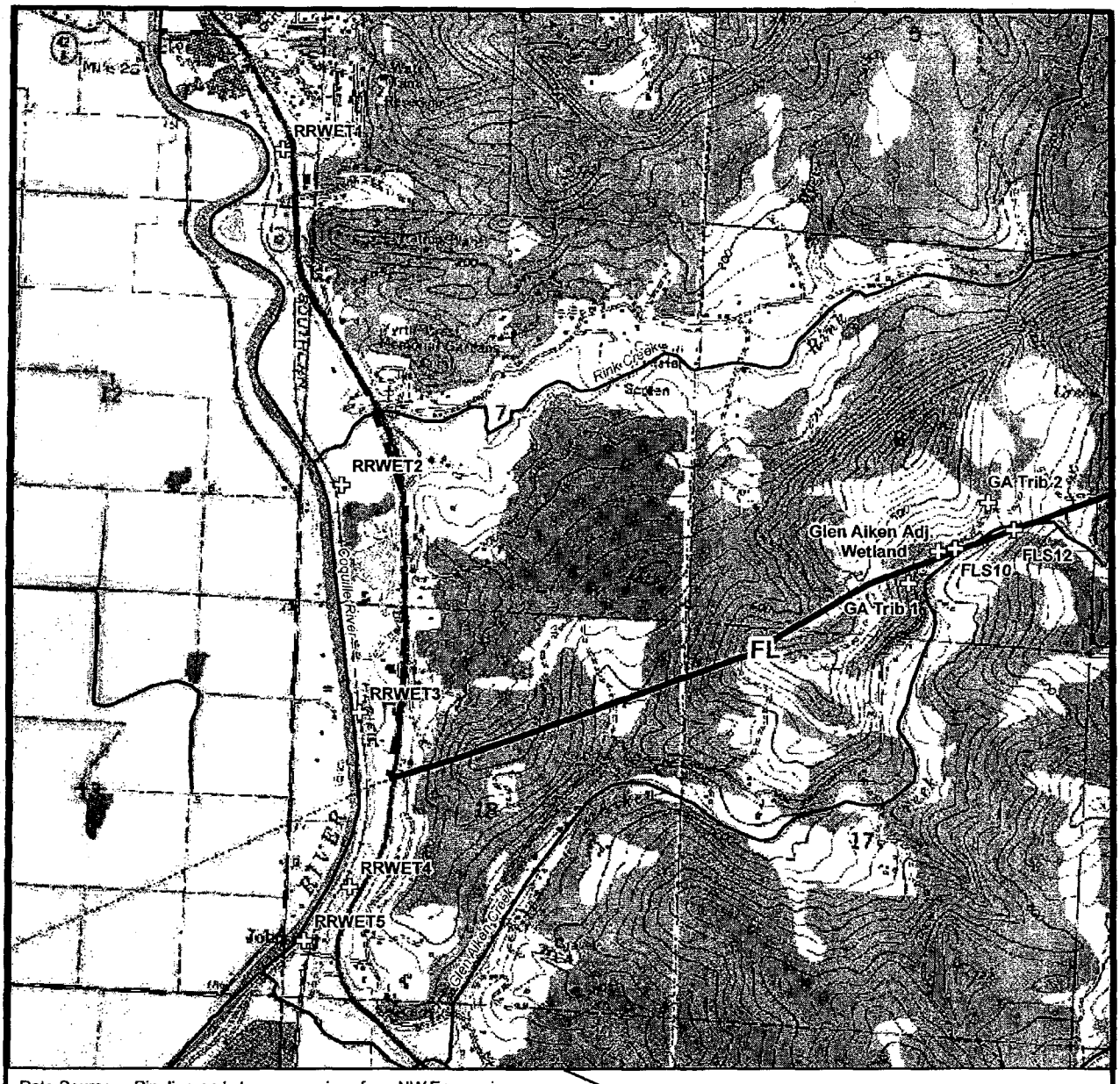
FAIRVIEW LATERAL

FIGURE A16

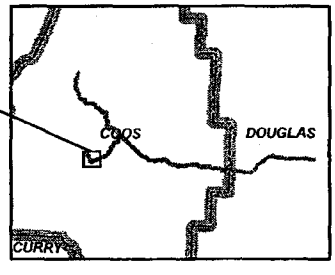


Data Sources: Pipeline and stream crossings from NW Economics Associates. Streams from Oregon Water Resources Department. USGS quadrangle (4 meter resolution) from TerraServer obtained September 2004.

All locations are approximate.

Lambert Conformal Conic
Oregon State Plane South
North American Datum 1983

Stream Crossings
Streams
Segment FL
Other Segments



Note: This drawing is for informational purposes. It is intended to assist in showing features discussed in an attached document.

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FAIRVIEW LATERAL

FIGURE A17

Map Revised: August 18, 2005

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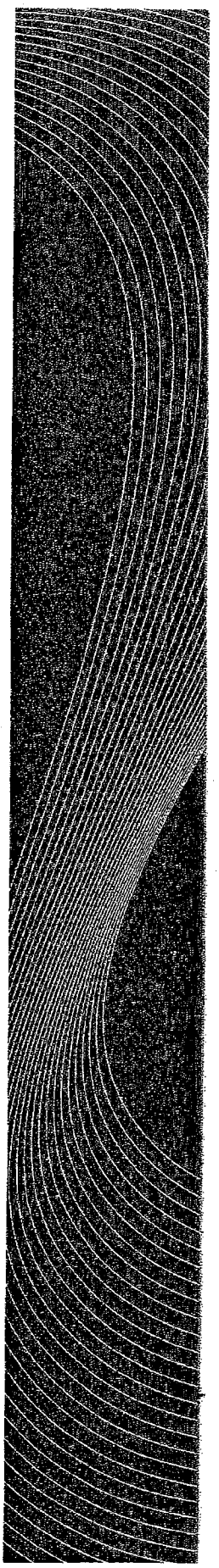


APPENDIX B
EARTHWORK SPECIFICATIONS

APPENDIX B
EARTHWORK SPECIFICATIONS

This appendix presents specifications for earthwork to be performed at selected stream crossings impacted by pipeline construction. Earthwork will include stream bed grade control and bank regrading. Specifications for streambed grade control are presented on the attached Figure B-1.

EARTHWORK SPECIFICATIONS

1. General

1.1. The Contractor is responsible to locate utilities including the gas pipeline and maintain a safe working distance from utilities.

1.2. Prior to commencing earthwork, sediment control such as sediment fence shall be installed in accordance with Appendix D of the Restoration Plan.

1.3. The Contractor shall take all precautions necessary to minimize input of sediment into waters during earthwork activities.

2. Execution

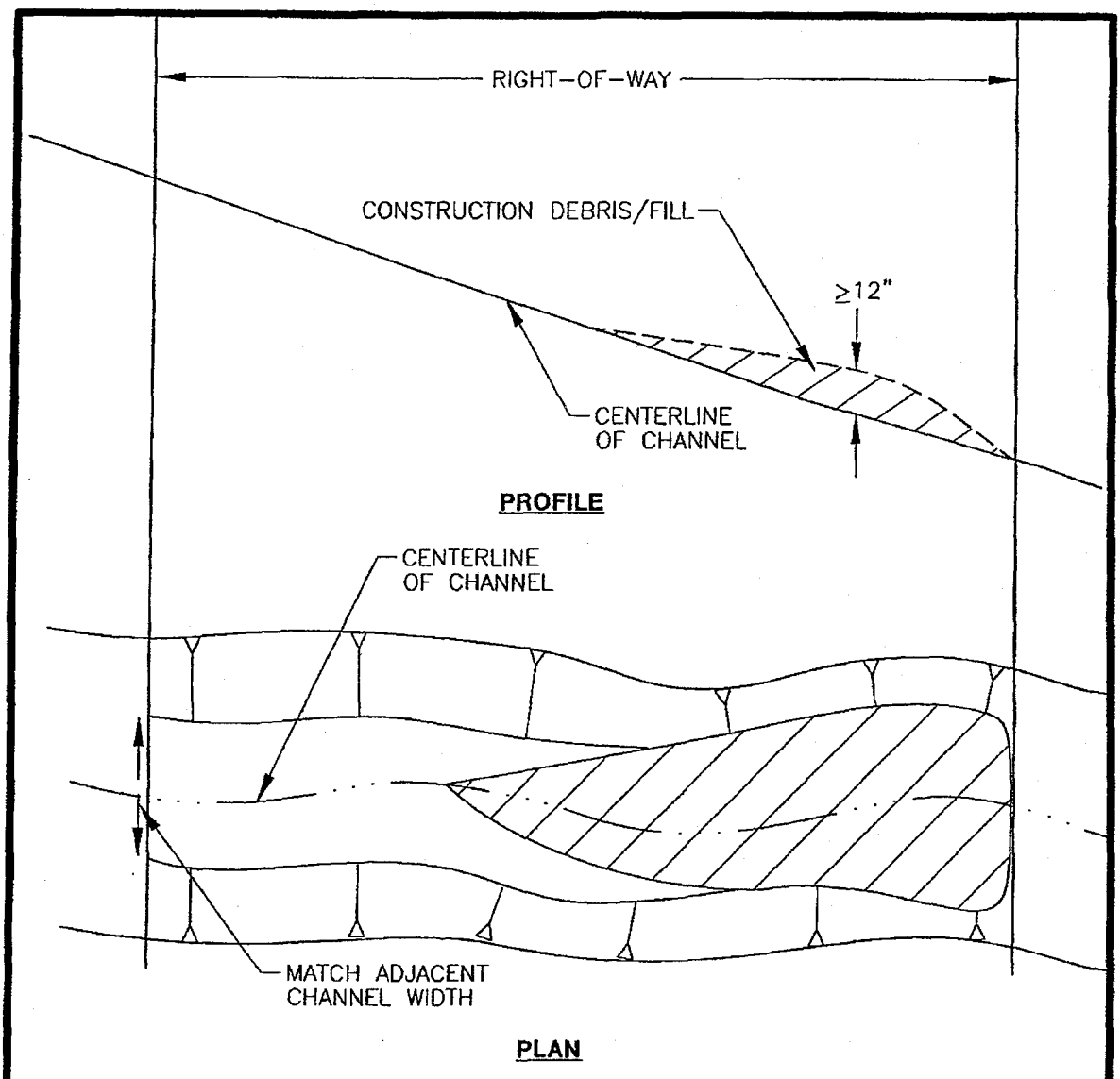
2.1. Perform earthwork at impacted stream crossing sites as described in the restoration plan, or otherwise directed by the on-site Representative and in accordance with the specifications presented in this Appendix.

2.2. Perform channel regrading in accordance with Figure B-1.

2.3. The specified regraded bank gradient shall be adjusted as necessary at the boundaries of the ROW in order to provide a smooth transition to match the adjacent grades.

2.4. Excavated soils generated from stream bank regrading shall be placed on gentle to moderate slopes not exceeding 50 percent gradient. Fills shall be placed a minimum distance of 5 feet from the crest of the regraded stream banks. The fills shall be spread over a sufficient area such that the total fill thickness does not exceed 2 feet. The fills shall be compacted in 12-inch lifts by operating the tracks of the excavation equipment over the soils until dense and well keyed.

2.5. All fills shall be compacted in 12-inch lifts at or near optimum moisture content and with suitable equipment necessary to achieve a dense state as determined by probing by the on-site Representative.



SPECIFICATIONS:

1. EXCAVATE FILL EXCEEDING 12–INCHES IN DEPTH OR 2 CUBIC YARDS FROM CHANNEL TO PROVIDE A UNIFORM GRADIENT ACROSS THE ROW.

2. CHANNEL WIDTH AND GRADES SHALL MATCH UP–STREAM AND DOWNSTREAM UNDISTURBED CHANNELS.

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CONCEPTUAL GRADE CONTROL DIAGRAM

FIGURE B-1

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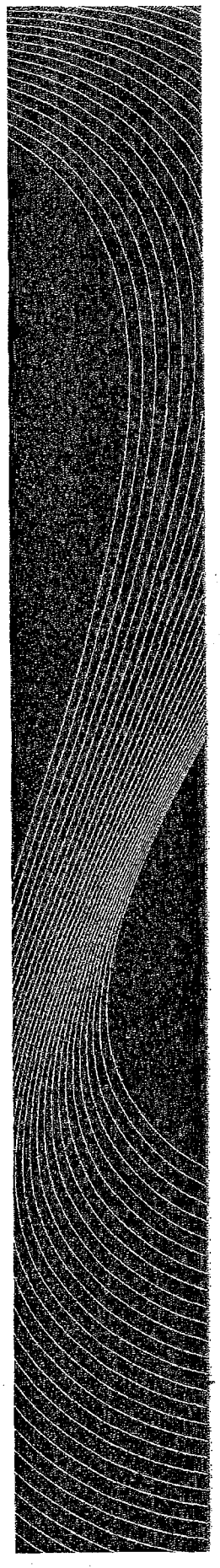


APPENDIX C

RIPARIAN PLANTING PLAN SPECIFICATIONS

APPENDIX C
RIPARIAN PLANT INVENTORY AND PLANTING PLAN SPECIFICATIONS

This appendix presents an inventory of native plant species in the project area and specifications for planting. The pipeline crosses through three primary ecosystems: the east side crossings (crossings A-1 through B-49), the mountain crossings (crossings C-50 through I-149), and the coastal crossings (crossings I-150 through I-188). The following table summarizes the native plant species that we anticipate encountering in each of the three zones along the pipeline ROW.

Table C-1. Native Plant Species for Each Climate/Ecosystem Zone

Plant Species	East side	Mountain	Coastal
*Hookers willow			X
*Sitka willow			X
*Wood's rose		X	X
*Pacific ninebark		X	X
*Red-osier dogwood			X
*Common snowberry	X	X	
*Black cottonwood		X	X
Serviceberry	X		
Red alder		X	X
Golden chinquapin		X	X
Evergreen huckleberry	X		X
*Oceanspray	X	X	X
*Salmonberry		X	X
*Indian plum		X	X
Salal		X	X
Sword fern		X	X
Dull Oregon grape	X	X	
Tall Oregon grape		X	
Sitka spruce		X	X
Western red cedar		X	X
Western hemlock		X	X
Vine maple		X	X
Bigleaf maple		X	X
Oregon white oak	X		
California black oak	X		
Grand fir		X	X
Douglas fir	X	X	X

*Indicates species suitable for live stake planting.

RIPARIAN PLANT SPECIES

Hookers willow (Salix hookeriana)

Hooker's willow (S. hookeriana) is a shrub to small tree with heights of 20 feet. Hookers willow grows in full sun to partial shade in saturated to moist soils. Transplanting success of hookers willow is generally high with a rapid growth rate. Hooker's willows are excellent for stabilizing slopes and bluffs where there is adequate moisture.

Sitka willow (Salix sitchensis)

Sitka willow (*S. sitchensis*) is a shrubby willow but can still grow to heights of 25 feet or more. They prefer saturated to moist soils and full sun to partial shade. These willows have fibrous, widespread and have moderately deep root systems. Transplanting success is high for both live stakes and container grown plants. The Sitka willow is often the preferred willow choice for restoration projects because of their high transplanting success rate and the wood stays sound when pounded with a mallet.

Wood's rose (Rosa woodsii)

Wood's rose (*R. woodsii*) is a small perennial shrub that typically reaches heights of less than 6 feet. This shrub forms dense thickets with extensive rhizomes that provide excellent soil binding properties (Hitchcock and Cronquist 1973, Tesky 1992). This species has good survivability in a variety of soils and hydraulic regimes and grows well on all aspects (Tesky 1992).

Pacific ninebark (Physocarpus capitatus)

Pacific ninebark is a shrub that grows to heights of 12 feet with a shallow fibrous root system. It prefers sun to shade with wet to moist soil conditions. This species grows well in alternating wet and dry hydrology which makes it useful for planting in riparian zones or areas with fluctuating water edges.

Red-osier dogwood (Cornus sericea)

Red-osier dogwood (*C. sericea*) is a 3 to 10 feet tall shrub with many stems. This species prefers rich, moist soils and is found in swamps, low meadows, and riparian areas. It is tolerant to flooding and commonly occupies floodplains and wetlands. It is well adapted to disturbances and its extensive root system makes it an excellent bank stabilization species (Crane 1989).

Common snowberry (Simphorocarpus albus)

Snowberry (*S. albus*) is an erect, rhizomatous shrub that can grow to reach 6 feet in height. This species prefers open sites, yet will grow in partial shade. Snowberry grows best in well-drained soils including riparian benches and terraces (Hitchcock and Cronquist 1973, Pojar and MacKinnon 1994). It is an important species as both food and cover for small mammals and birds and survives well in disturbed areas (McWilliams 2000).

Serviceberry (Amelanchier alnifolia)

Serviceberry (*A. alnifolia*) is a deciduous shrub to small tree that can grow to reach 25 feet in height. It often forms thickets, mats, or grows in clumps (Pojar and MacKinnon 1994). This growth encourages wildlife use due to the dense cover mature plants provide. Serviceberry (*A. alnifolia*) can tolerate infertile soils as well as nutrient-rich substrates. This is an early success ional species that tolerates full sun to partial shade and declines with canopy closure (Howard 1997).

Red alder (Alnus rubra)

Red alder is a deciduous tree that can grow to 75 feet tall. Red alder is commonly found in moist woods and along stream banks and floodplains. It is an aggressive, fast-growing hardwood that thrives in moist, disturbed sites, making it an excellent species for restoration planting (Pojar and MacKinnon, 1994). It can be planted at lower elevations (below 1,000 feet) on both wetland and non-wetland sites and is intolerant of shade (Cooke, 1997).

Sitka spuce (Picea sichensis)

Sitka spruce is the tallest conifer in North America and can grow to be more than 200 feet tall and have a diameter of 6 feet. It can grow in pure or mixed stands on moist, well-drained sites such as alluvial floodplains, marine terraces, recent glacial outwash, and on old logs in boggy sites. It is common in river and stream floodplains and within the coastal fog belt. Sitka spruce should be planted at low to middle elevations up to 2,100 feet.

Golden chinquapin (Chrysolepis chrysophylla var. chrysophylla)

Golden chinquapin (Chrysolepis chrysophylla var. *chrysophylla)* grows from sea level to 2,000 meters along the coast from Washington to northern California, extending inland to the Cascades and Sierra Nevada. These trees, up to 75 feet in height, typically thrive in dry soils. Golden Chinquapin prefers a well drained sunny location but will grow underneath a canopy of Douglas Firs. It can be found in dry open sites to fairly thick woodlands and from below sea level to 2,500 ft. (152-762 m) elevation. In Washington, this species is associated with Douglas fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), Pacific rhododendron (*Rhododendron macrophyllum*), salal (*Gaultheria shallon*), dull Oregon grape (*Berberis nervosa*), vine maple (*Acer circinatum*), and evergreen huckleberry (*Vaccinium ovatum*). This slow growing tree or large shrub is best planted from container stock at a young age.

Evergreen huckleberry (Vaccinium ovatum)

Evergreen huckleberry is an erect, bushy, evergreen shrub that can grow up to 12 feet tall. It is commonly found in coniferous forests at low elevations, especially near forest edges and openings. Evergreen huckleberry is often found on close to tidewaters on the beach fringe in the salt spray zone and is most successful in acidic soil.

Oceanspray (Holodiscus discolor)

Oceanspray is an erect deciduous shrub that grows up to 12 feet tall. Oceanspray is an upland shrub that commonly grows in dry to moist open sites at low to middle elevations. It is a versatile plant for restorations and will survive in a variety of moisture regimes from well drained sites to dry sites and it is shade tolerant. Oceanspray typically become established in open woods, thickets, clearings, logged areas, ravine edges, and coastal bluffs.

Salmonberry (Rubus spectabilis)

Salmonberry is a deciduous shrub that usually grows between 3 to 12 feet tall. It thrives in moist to wet places from sea level to subalpine mountain slopes and likes shady places. It is commonly found in lowland moist woods, disturbed sites, along stream banks, and in/near wetlands. With its deep roots and suckering habits, salmonberry can hold soil intact on a steep slope or at the edge of a stream. Stands of salmonberry flourish after soils have been disturbed by construction, logging or fire.

Indian plum (Oemleria cerasiformis)

Indian plum is a deciduous shrub to small tree that can grow up to 18 feet tall. It can be found along stream banks, roadsides, open woods, and open areas at low elevations. It grows in dry to moist soils and is tolerant of a fluctuating water table. It is able to grow in moister soils than many other upland shrubs. It is shade tolerant and therefore able to grown in forest openings and forest edges.

Salal (Gaultheria shallon)

Salal is generally a low growing, shade tolerant, evergreen shrub that can sometimes reach heights up 15 feet. It is commonly found at low to mid elevations in moist to dry woods and on exposed bluffs. Salal is frequently present in upland conifer forests and can be found in forested wetlands on raised hummocks or topographic features. Salal is among the most common forest understory shrubs in the region and is often associated with Oregon grape and sword fern. Salal is extremely adaptable, thriving in sun, shade, humus, infertile, dry or moist soils. It requires little care once it is established.

Sword fern (Polystichum munitum)

Sword fern are big, evergreen ferns that are common in the understory of moist forests. Sword fern are generally found from low to middle elevations and are very shade tolerant. They can grow from 2 to 3 feet tall and 4 to 6 feet wide. The sword fern will grow most successfully under classic fern conditions - moist, loamy soil with nearly full shade. However, it does quite well in dry shade, partial shade, and in soil with low to moderate nutrient levels. The sword fern prefers year-round moisture, but once established, the deep and fibrous roots make it quite drought resistant, especially when shaded. The deep roots make sword fern an excellent shrub for stabilizing slopes.

Dull Oregon grape (Mahonia nervosa)

Dull Oregon grape is an erect, evergreen shrub that can grow up to 5 feet tall. It is a highly shade tolerant shrub that prefers dry to fairly moist sites within open to closed forests at low to middle elevations. It commonly occurs in shady, upland woods adjacent to wetland areas. It is often associated with salal, sword fern, Douglas fir, and western hemlock.

Tall Oregon grape (Mahonia aquifolium)

Tall Oregon grape is very similar to dull Oregon grape however is generally grows slightly larger and prefers sunnier conditions. It is commonly found in drier, more open than dull Oregon grape. As such, it is successful when planted in open spaces and on the edge of woods.

Western red cedar (Thuja plicata)

Western red cedar is a massive evergreen tree with broad spreading and drooping branches that can grow up to 180 feet tall. Western red cedar is most successful in moist habitats in areas with a maritime climate and high rainfall. In drier areas, western red cedar is generally found only on wet sites such as ravines, seeps, riparian zones, and poorly drained bottom lands. It should be planted from sea level to 2,500 meters.

Western hemlock (Tsuga heterophylla)

Western hemlock is an extremely shade tolerant evergreen tree that grows up to 180 feet tall. Western hemlock is often the dominant tree in lowland forests in Oregon and is common from low to middle elevations. It can occupy all but the very wettest and driest sites.

Vine maple (Acer circinatum)

Vine maple is a deciduous shrub to small tree that can reach heights of 24 feet tall. Its sprawling branches can often root to form new colonies. The dense root masses are important for providing bank stabilization. Vine maple is generally found in forest openings or clearings adjacent to wetlands or in the zone between wetlands and uplands where soils are moist, but not saturated for long durations. It is successful along stream banks and often forms dense thickets. It should be planted at low to middle elevations, below 3,000 feet.

Bigleaf maple (Acer macrophyllum)

Big leaf maple is a large deciduous tree that can grow to 100 feet tall and is very common in western Oregon. Big leaf maple can become established in a wide variety of sites from uplands to the transition zone between wetland and upland. It can survive in dry to moist sites from sea level to 3,000 feet and is often associated with ocean-spray, sword fern, and Douglas Fir.

Oregon white oak (Quarcus garryana)

Oregon white oak is a deciduous tree that can grow up to 75 feet tall but it often short and crooked. Oregon white oak grows in dry soils on rocky slopes or bluffs and can grow deep, well drained soils at low elevations. It prefers full sun and is tolerant to drought.

California black oak (Quarcus kelloggii)

California black oak is a fast growing deciduous tree that reaches heights of 75 feet. It has similar habitat requirements to the Oregon white oak although it is less tolerant to drought.

Grand fir (Abies grandis)

Grand fir is a large evergreen tree that grows up to 200 feet tall. It is commonly found in dry to moist coniferous forests in rainshadow areas from low to middle elevations. Grand fir is shade tolerant and fast growing and prefers moist, but well drained soils.

Douglas Fir (Pseudotsuga menziesii)

Douglas fir is a large evergreen tree that can reach over 200 feet tall. It is generally found at low to mid elevation on moist to dry sites. It is most successful when established in full sun on moist soil. Douglas fir often becomes established following forest fires and is able to inhabit sites under conditions that are hostile to other conifers.

SPECIFICATIONS

1.0 Plant Survey Specifications:

1.1 Plant Survey Area

1.1.1 The survey of adjacent riparian plant species shall be completed by establishing a transect within a representative area adjacent to the pipeline ROW.

1.1.2 The 10-foot wide transect shall begin at the OHWM and extend outward perpendicular to the channel a distance of 30 feet. In circumstances where the vegetation density is significantly different on either side of the ROW or on either bank of the stream, two transects shall be established; one on each side of the stream.

1.1.3 The survey plot for stream crossings that are located within a utility ROW (BPA, PP&L) shall come from within the ROW. The adjacent undisturbed areas outside of the utility ROW should not be used to determine the density of restoration plantings. The transect must be situated within an undisturbed adjacent area that is within the ROW. If the entire width of the ROW has been disturbed, then a survey plot shall be established at an adjacent stream crossing that is within a utility ROW and is representative of the disturbed crossing.

1.2 Survey Count

1.2.1 All trees with stalks/trunks greater than 2 inches-diameter at breast height (DBH) and shrubs 3 feet or higher within the survey plot boundary shall be identified, counted, and their distribution within the transect sketched.

1.2.2 The total number of each species counted in the survey area shall be summed to equal the total of all plants counted. The percentage of each species shall then be calculated by dividing the total number of each species by the total number of all plants counted. Only species with 20 percent or greater dominance shall be included in the planting restoration plan.

1.2.3 The density of species ($\geq$ 20 percent dominance) shall then be calculated and will equal the number of individuals counted per 300 ft^2 (the area of the transect).

1.2.4 Herbaceous species shall not be included in the survey count.

2.0 Riparian Planting Plan

2.1 The density of the restoration plantings should be equal to the density of the undisturbed adjacent areas plus 20 percent. The area will be over-planted by 20 percent to account for potential mortality of the restoration plantings. Existing natural recruitment shall be included to satisfy the required density.

2.2 Species planted within a utility ROW shall have a maximum growth height, such that a 30-foot overhead clearance will be maintained from the vegetation and overhead power lines.

2.3 Plant stock species suitable for live stake planting shall be obtained from cuttings as available from adjacent on-site source stock. Prior to planting, live stakes shall be dipped in a rooting hormone solution and installed in accordance with Figure C-1. Plant stock shall be supplemented with nursery stock as needed to meet the required planting density.

2.4 Plant stock species not suitable for live staking shall be obtained from local approved stock as to not introduce non-native species.

2.5 To ensure healthy viable plant stock, an approved native stock nursery will be contracted to propagate the appropriate species immediately after approval of this planting plan.

2.5.1 The nursery will utilize only species or variations that are indigenous to Coos and Douglas Counties to ensure that invasive or ornamentals are not introduced into the area.

2.6 Containerized plantings shall be placed in a space cut into erosion control fabric to match the diameter of the container. Edges of the Erosion control fabric shall be wrapped into the hole dug for the containerized plant prior to placing the plant in the hole.

3.0 Seeding Specifications

3.1 Seed shall consist of one of the following mixes.

3.2 Seed shall be spread with a spreading device such that an even amount of seed is dispersed over the surface of the site. No more than ¼-inch of free space shall be visible between adjacent, individual seeds.

Table C-2. ODOT Spec Book Native Mix

Common Name	Scientific Name	Percentage of Mix*
California Brome	*Bromus carinatus*	24%
Meadow Barley	*Hordeum brachyantherum*	24%
Blue Wildrye	*Elymus glaucus*	26%
Native Red Fescue	*Festuca ruba*	26%

*Applied at a rate of 34 pounds/acre

Table C-3. ODOT Best Seed Native Mix

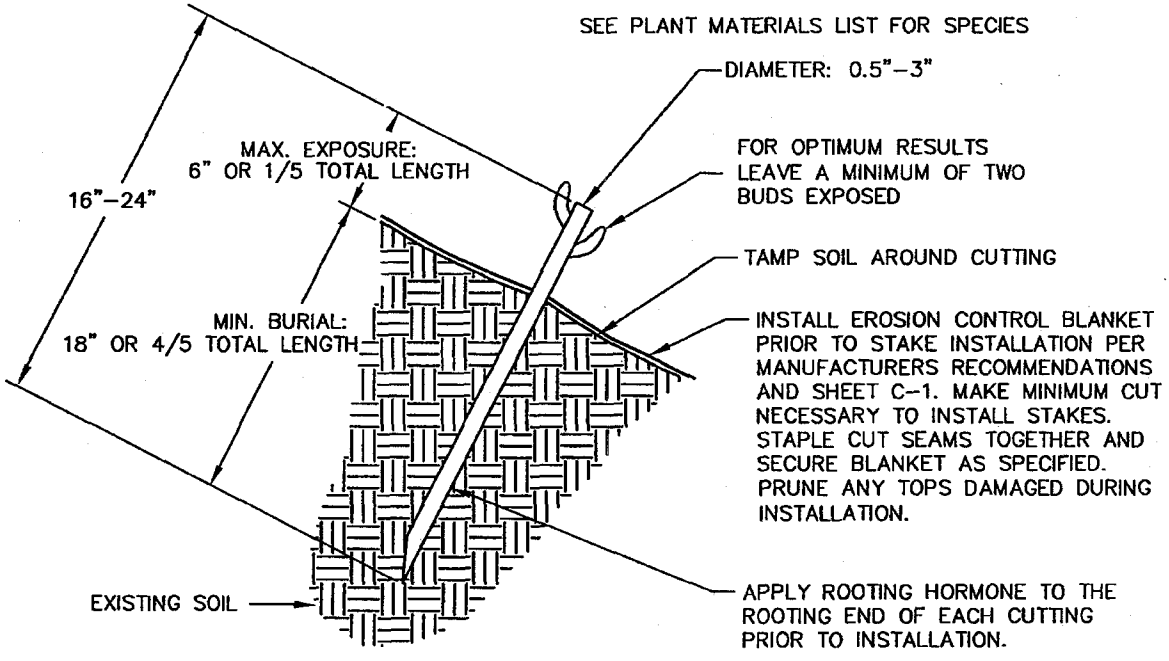
Common Name	Scientific Name	Percentage of Mix*
Native Red Fescue	*Festuca rubra*	71%
Hederma Sickle-keeled Lupine	*Lupinus albicaulua, "Hederma"*	14%
Elkton Blue Wildrye	*Elymus glaucus "Elkton"*	15%

*Applied at a rate of 63 pounds/acre

Table C-4. Coos Bay BLM Native Mix

Common Name	Scientific Name	Percentage of Mix*
Blue Wildrye	*Elymus glaucus*	50%
California Brome	*Bromus carinatus*	40%
Red Fescue	*Festuca rubra*	7%
Tufted Hairgrass	*Deschampsia caespitosa*	3%

*Applied at a rate of 30 pounds/acre



LIVE STAKE INSTALLATION DETAIL

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NOTE: AVOID STRIPPING THE BARK OR NEEDLESS BRUISING OF STAKES DURING INSTALLATION. USE AN IRON BAR OR STAR DRILL TO PREPARE HOLES FOR THE STAKES. DO NOT USE AXE OR SLEDGE FOR INSTALLING STAKES IN HOLES. USE DEAD BLOW HAMMER OR WOODEN MALLET.

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LIVE STAKE INSTALLATION DETAIL

FIGURE C-1

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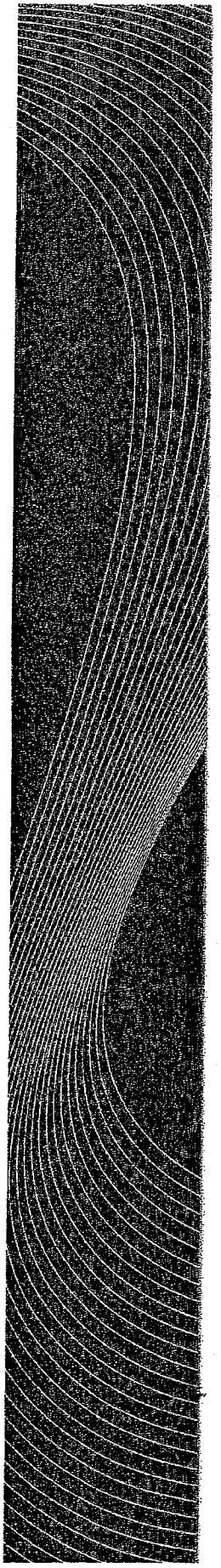


APPENDIX D
EROSION CONTROL SPECIFICATIONS

APPENDIX D
EROSION CONTROL SPECIFICATIONS

This appendix presents erosion control specifications. General specifications are described below. Installation details and specifications for erosion control are included on the attached figures.

1.0 Erosion Control

1.1 Erosion Control BMP's shall be placed in general accordance with Figure D-1.

1.2 Silt fence shall be installed at the waters edge prior to beginning earthwork activities.

1.3 Erosion control matting shall be installed on regraded banks immediately after site grading and prior to planting.

1.4 Coir logs shall be installed at the toe of the stream banks in accordance with Figure D-4. Coir logs shall consist of a minimum 12-inch diameter RoLanka BioD-Roll or approved equivalent.

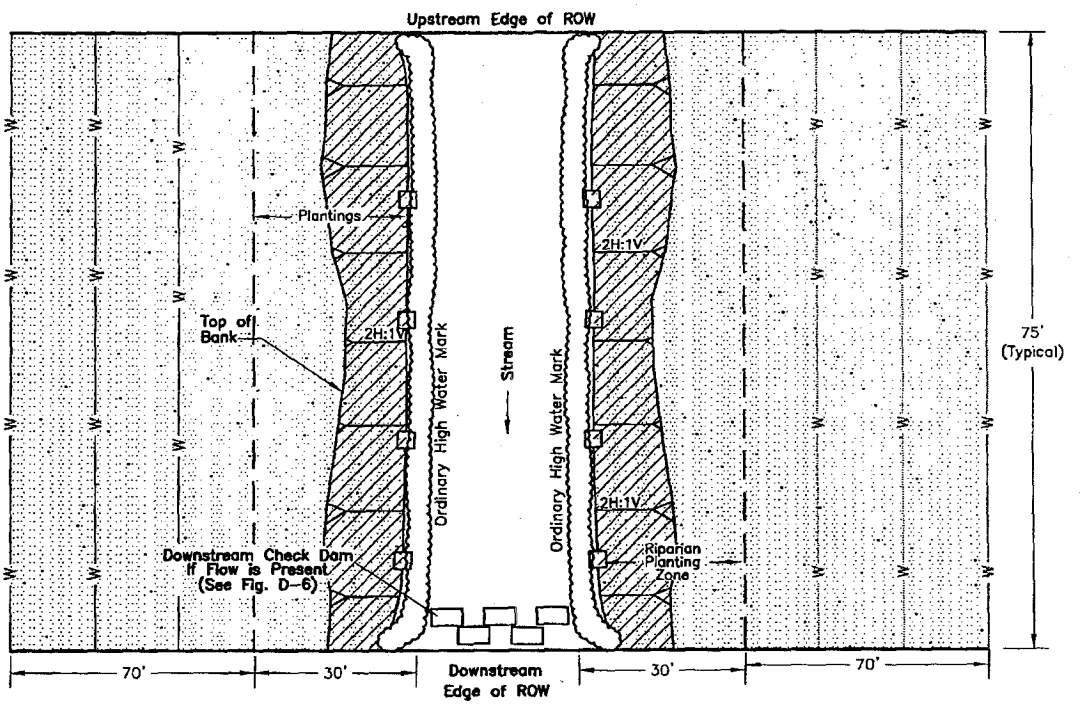
1.5 Wattles shall be placed on exposed slopes steeper than 3H:1V within 100 feet of the OHWM in accordance with Figure D-5.

1.6 Disturbed or exposed soils within 100 feet of the OHWM or other areas disturbed by construction equipment during restoration activities shall be seeded and mulched immediately following earthwork activities.

1.7 Mulching Specifications (from the Coos County Natural Gas Pipeline EIS)

1.7.1 Straw mulch shall consist of straw from bentgrass, fescue or ryegrass singly or in combination. If no grass seed straw is available, straw from barley, oat, or wheat is allowed if approved by the project engineer. The straw shall not be moldy, caked, decayed or of otherwise low quality. Submit verification from the supplier that the straw is free of noxious weeds. Acceptable documentation submitted shall show either: 1) that the straw source is from an "Oregon Certified Seed" field, or 2) the seed lab test results of the seed harvested from the straw meet minimum Oregon Certified Seed quality for weed seed content. The minimum requirements of Oregon certified seed are as published in the current year's Oregon Certified Seed Handbook available from County Extension Offices or Oregon State University.

1.8 Straw Mulch shall be placed over the seeded surface 50 mm deep such that the soil surface is not visible through the mulch, yet sunlight can still penetrate the mulching.



EXPLANATION:

- SILT FENCE
- W — WATTLE
- COIR LOGS
- MULCH AND SEED
- TYPE C EROSION CONTROL MAT

SPECIFICATIONS:

1. SILT FENCE SHALL BE INSTALLED PRIOR TO WORK AS SHOWN ABOVE, AND IN ACCORDANCE WITH FIGURE D-2.
2. EROSION CONTROL MATTING SHALL CONSIST OF TYPE C FOR CLAY SOILS STEEPER THAN 3H:1V, AND SHALL BE INSTALLED ON BANKS IN ACCORDANCE WITH FIGURE D-3.
3. COIR LOGS SHOULD BE INSTALLED AFTER BANK REGRADING AS SHOWN ABOVE, AND IN ACCORDANCE WITH FIGURE D-4.
4. WATTLES SHALL BE PLACED ON ALL DISTURBED OR POORLY VEGETATED SLOPES EXCEEDING 3H:1V UPHILL OF RESTORED BANKS AS SHOWN ABOVE, AND IN ACCORDANCE WITH FIGURE D-5.
5. ALL DISTURBED OR POORLY VEGETATED AREAS SHALL BE SEEDED AND MULCHED. SEED SHALL BE PLACED AT A RATE OF 44kg OF PURE LIVE SEED PER HECTARE. STRAW MULCH SHALL BE APPLIED 50mm DEEP SUCH THAT THE SOIL SURFACE CANNOT BE SEEN THROUGH THE MULCH. ALL SEED AND MULCH SHOULD CONFORM TO THE SPECIFICATIONS IN APPENDICES C AND D RESPECTIVELY.
6. IF WATER IS PRESENT A BIO BAG DAM SHALL BE CONSTRUCTED AT THE DOWNSTREAM EDGE OF THE R.O.W. IN ACCORDANCE WITH FIGURE D-6.

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TYPICAL EROSION CONTROL PLAN

FIGURE D-1

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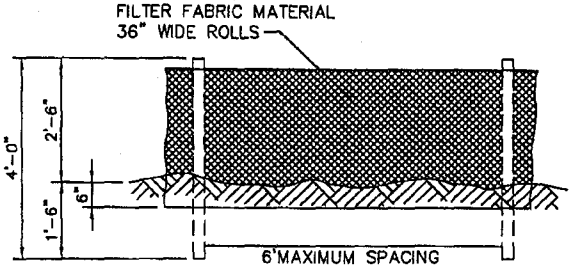

FRONT VIEW
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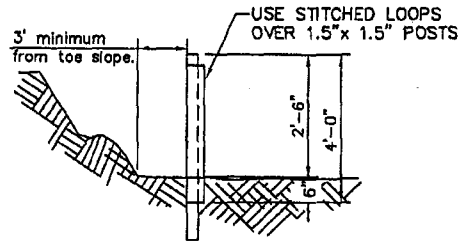

PROFILE
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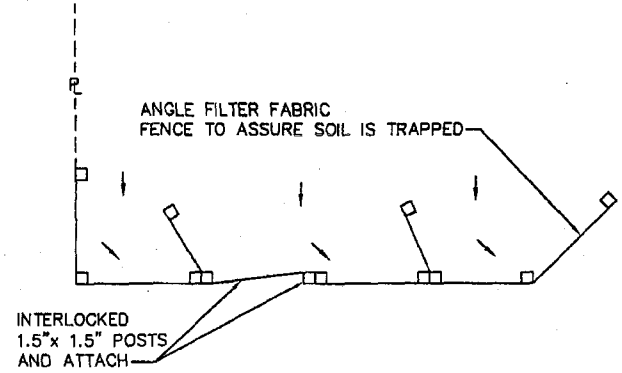

PLAN VIEW
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SEDIMENT FENCE

Temporary sediment trap consisting of an entrenched geotextile stretched across and attached to supporting posts. Sediment fences are adequate to treat flow depths consistent with overland or sheet flow. Standard- or heavy-duty sediment fence fabric must meet specific ASTM requirements, outlined in **Table 2.**

General

See **Table 2** for Sediment Fence Fabric Specifications.
Show sediment fence installed along ground contours according to **Table 1.**
Sediment fence should only be used for sheet and rill erosion and to surround soil piles.
Standard- or heavy-duty sediment fence filter fabric shall have manufactured stitched loops with 2"x2"x4' posts.
Stitched loops shall be installed on the uphill side of the sloped area.
Sediment fences should be installed a minimum of 3 feet from toe of slope in order to maximize storage.
A trench should be excavated 6 inches deep along the line of the posts.
Trench should be backfilled and the soil compacted on both sides of the sediment fence.
Posts should be spaced a maximum of 6 feet apart and driven securely into the ground a minimum of 12 inches.
When sediment fence approaches its' termination point, turn fence uphill and extend one full panel (6 feet).
When joining two or more sediment fences together, join the two end stakes by wrapping the two ends at least one and one-half turns and driving the joined stakes into the ground together.
Height of a sediment fence should not exceed 3 feet. Storage height and ponding height should never exceed 1.5 feet.

Table 1
Barrier Spacing for General Application

Install Parallel Along Contours as Follows		
% Slope	Slope	Maximum Spacing on Slope
10% Flatter	10H:1V or Flatter	300 feet
10 > %	<15 10H:1V > x < 7.5H:1V	150 feet
15 > %	<20 7.5H:1V > x < 5H:1V	100 feet
20 > %	<30 5H:1V > x < 3.5H:1V	50 feet
30 > %	<50 3.5H:1V > x < 2H:1V	25 feet

Table 2
Sediment Fence Fabric Specifications

Woven Polypropylene Sediment Fence Fabric		
Property	Test Procedure	Minimum Fabric Value
Grab Tensile Strength	ASTM D 4632	180 lbs.
Grab Elongation	ASTM D 4632	15%
Trapezoid Tear	ASTM D 4533	70 lbs.
Mullen Burst	ASTM D 3786	300 psi
Puncture	ASTM D 4833	80 lbs.
Permittivity	ASTM D 4491	.07 sec-1
Permeability	ASTM D 4491	.005 cm/sec.
A.O.S.	ASTM D 4751	50 U.S. Standard Sieve
UV Resistance (500 hours)	ASTM D 4355	90%

Inspection and Maintenance

Inspect daily on active sites, once per week on in-active sites, and within 24 hours following a 0.5-inch rain event within a 24 hour period.
Immediately repair any damage.
Remove accumulated sediment once it has reached 1/3 the height of the sediment fence or 1 foot maximum.
Inspect for channel formation parallel to the fence, which indicates the geotextile is acting as a flow barrier.
Replace deteriorated or clogged geotextile.
Check for under cutting or piping under fence.

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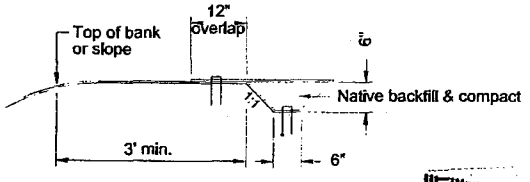
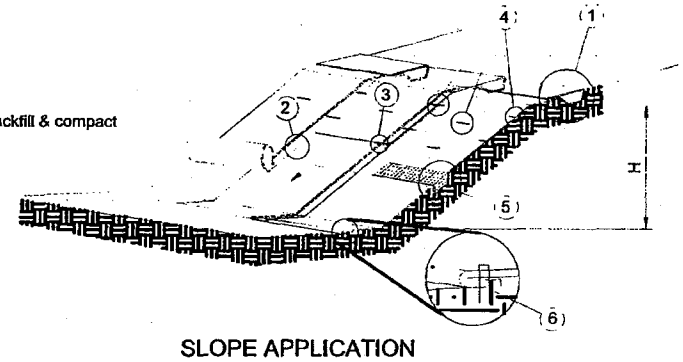
SEDIMENT FENCE INSTALLATION

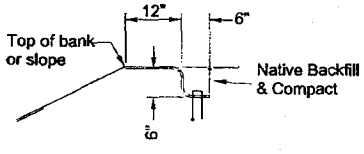
FIGURE D-2



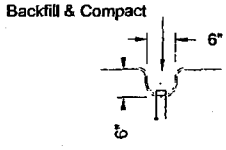
(TRENCH, H ≤ 3')
FIGURE A1



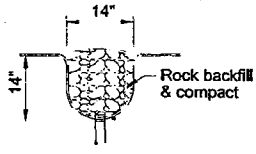
SLOPE APPLICATION



(TRENCH, H ≤ 3')
FIGURE A2



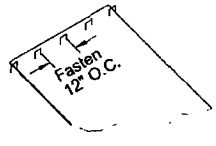
(CHECK SLOT, SLOPE)
FIGURE A3



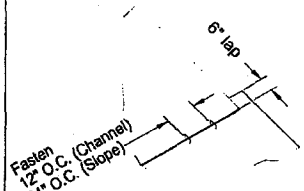
(CHECK SLOT, CHANNEL)
FIGURE A4

Slope application:

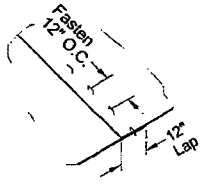
1. Anchor matting at top of slope (Fig. A1 & A2) Fasten in trench and at overlap 12" O.C. (Fig. B1)
2. Overlap mat edges 6" and fasten (Fig. B2). Install matting so edge overlaps are shingled away from prevailing winds. Fasten edges 24" O.C.
3. Overlap mat ends 12", upper mat over lower mat, and fasten (Fig. B3).
4. Stagger alternate rows of fasteners placed at 24" O.C.
5. Construct check slot when specified or as recommended by the manufacturer (Fig A3). Fasten mat in bottom of check slot (Fig. A3 & B1)
6. Extend mat 24" beyond toe of slope; fold mat back under 4" and fasten (Fig. B1)



(BEGINNING EDGE)
FIGURE B1



(EDGE LAPS)
FIGURE B2



(END LAPS)
FIGURE B3

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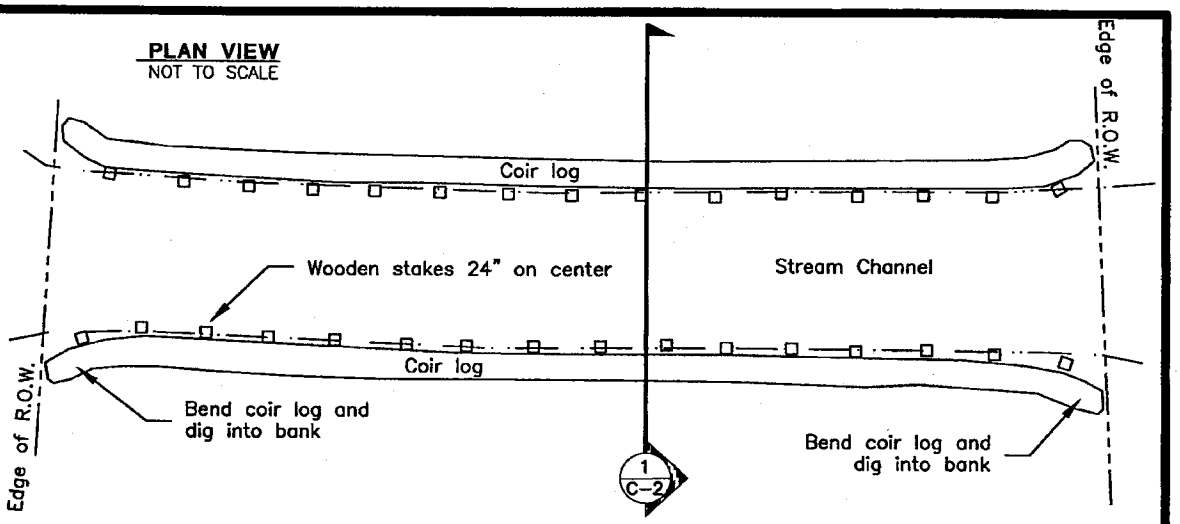
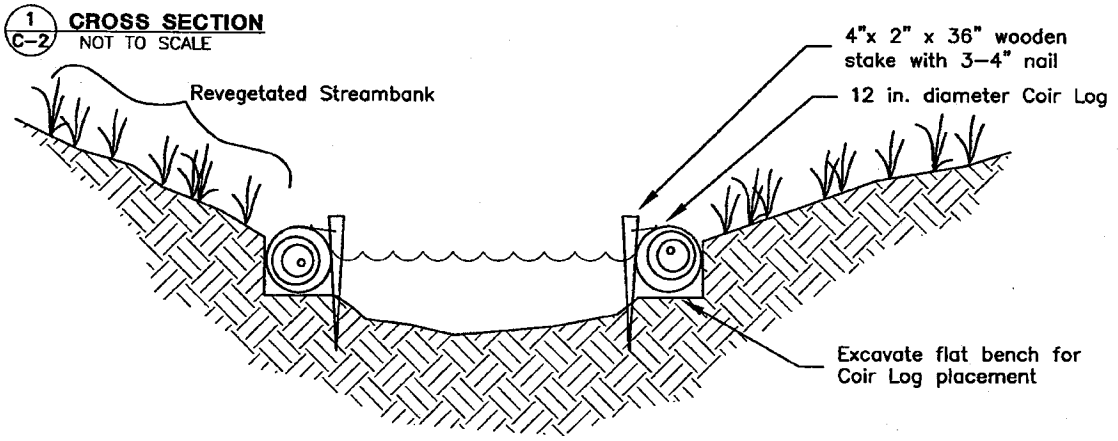
MATTING NOTES AND DETAILS

FIGURE D-3





Specifications:

1. Install coir logs on flat area hand excavated at the base of the stream bank where the water level is 1/2 to 2/3 of the coir roll's height.

2. Adjacent coir logs shall be secured to one another by tying with coir twines.

3. Adjacent coir logs shall be anchored on the outside of log by minimum of 4" x 2" x 36" wooden wedges with a 3" to 4" nail at the top for holding the coir roll down.
   - 3.1 Stakes shall be placed on 24" spacing.
   - 3.2 Stakes shall be tied to the coir rolls with a few loops of coir twine.

4. Bend the ends of the first and last coir logs towards the shore and dig them into the bank to prevent water from eroding behind the coir log.

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COIR LOG INSTALLATION

FIGURE D-4

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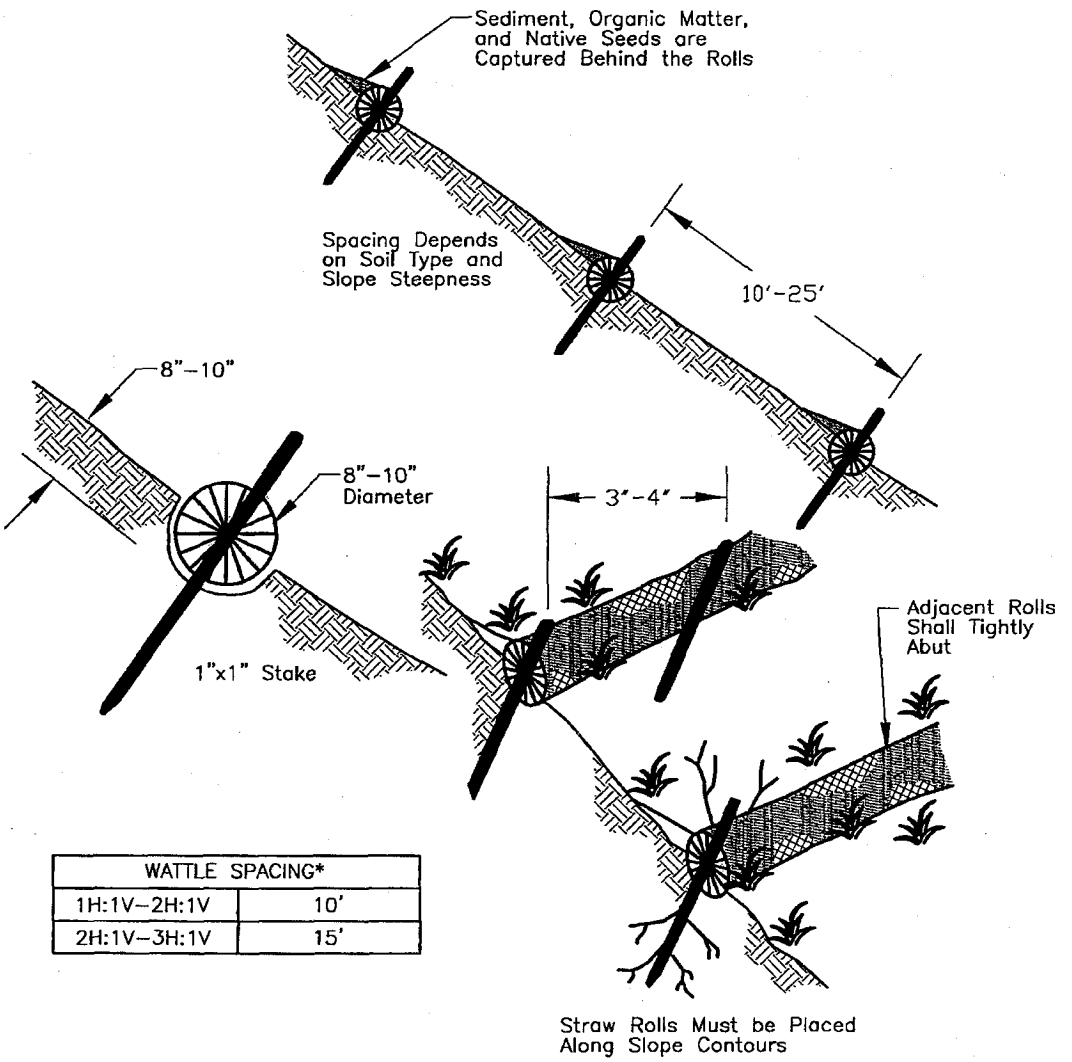

WATTLE SPACING*	
1H:1V–2H:1V	10'
2H:1V–3H:1V	15'

SPECIFICATIONS:

1. Place wattles on all poorly vegetated or disturbed slopes greater than 3H:1V within 100' of the OHWM.
2. Wattles shall be placed on contour, perpendicular to slope.
3. Wattles shall be placed into 3–5" deep trench to ensure that water does not seep beneath the wattles.
4. Drive anchor stakes through wattle, perpendicular to slope.
5. Anchor stakes shall consist of wooden 1"x1"x18" stakes.

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WATTLE INSTALLATION

FIGURE D-5

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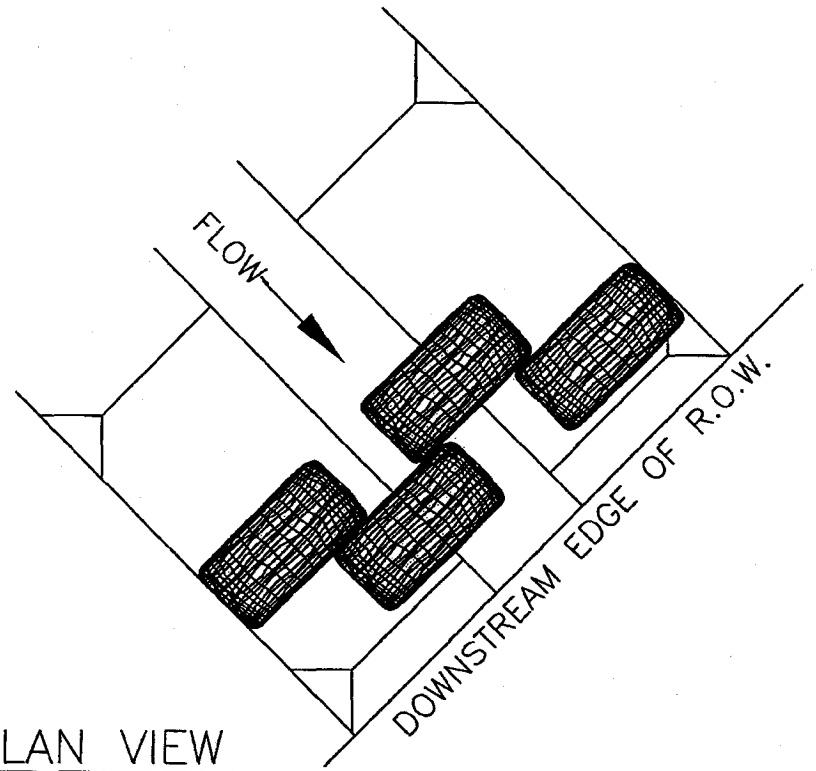
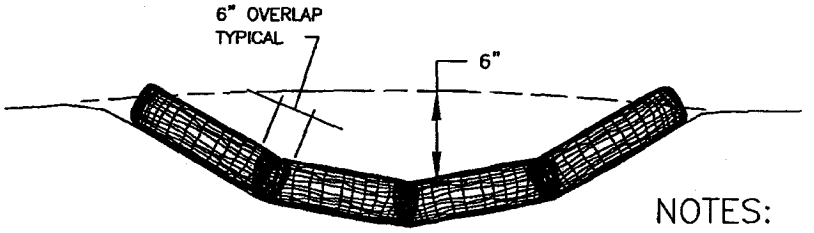


PLAN VIEW
NTS



PROFILE
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NOTES:

1. STAKING OF BAGS REQUIRED USING (2) 1"X2" WOOD STAKES OR APPROVED EQUAL PER BAG.
2. SURFACE MUST BE SMOOTH BEFORE APPLICATION.

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BIO BAG CHECK DAM INSTALLATION

FIGURE D-6